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The new problems that are posed in both medicine and the behavioral sciences require a concerted attack by all the disciplines concerned with the study of man. The conference on culture, society, and health was organized to promote the integration of medical and social science findings toward increased understanding of the social ecology of disease and a unified concept of the human being in his natural and cultural environment. We are indebted to the participants for their contributions to this field of knowledge and to their ability to communicate across disciplinary barriers. It is hoped that the conference will serve to refine problems in research methodology and to further the delineation of needs and prospects for interdisciplinary research in the universal problem of health and illness.

INTRODUCTORY REMARKS

L. C. Dunn

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I suppose some explanation is called for as to why a representative of a science that deals with material elements, genes, finds himself introducing speakers who will deal with sociocultural factors in chronic organic disease. It cannot be for technical competence since the methods of genetics and those required for the study of culture and society are very different. The elements of analysis in genetics are particles, probably to be conceived at the level of the nucleotides, those structural elements of the nucleic acids that carry the transmission system of heredity and specify the kinds of proteins that are to be constructed by living cells. The elements of societies and cultures are human individuals in their relations with each other and with the environment. An obvious relationship exists, however, between the study of heredity and of human culture in relation to disease that transcends the differences in methods. It is this: human populations, both now and in the past, represent outcomes of an evolutionary process of which the guiding force is natural selection. Both human beings and other organisms adjust to their environments *as populations*. The essential factor in biological adjustment is the differential representation of the variety of genotypes in successive generations. The action of natural selection and of other evolutionary forces is inferred from observed changes in the frequencies of different genotypes. Sociocultural conditions affect the mating pattern, the attitudes of the society toward biological characters such as fertility, health, disease, the development of medical and sanitation practices, and in many other ways that affect the probability that the pattern of genetic variety in the population will be maintained or changed.

Illustrations of the effects of natural selection on human populations have usually been drawn from relationships between simple gene differences and obvious phenotypic differences affecting differential survival, as in the cases of the genes for sickle-cell anemia, thalassemia, primaquine sensitivity (favism), blood group O and peptic ulcer, and RH constitution and erythroblastosis. The reason for this is obvious: one deals first with genes that are readily identified and connected with phenotypes for which diagnostic criteria have been developed and tested. Experimental genetics followed the same path in the early years of this century.

Studies in human populations of cases such as those listed above are of great interest and are leading to important advances both in theoretical and applied knowledge. If our response to these studies, however, is primarily to the dramatic proof that a single gene acts as a differential between life and death, we are likely to draw wrong conclusions. There is a common attitude, for example, that the transmission of a gene entails a train of inevitable consequences, culminating in the acquisition by the possessor of that gene of a set of symptoms or characters. The clear lesson of experimental genetics on the other hand is that characters as such are not inherited. What is inherited is a genetic constitution capable of responding during its course of development to the environments in which development occurs. The latitude of response permitted by the inherited constitution may be narrow, as in the case of the genes for blood antigens, or so wide, as in the case of diabetes and many other so-called inherited diseases, that no difference may be observed between carriers of that genetic constitution and its normal alternative. In most cases the fate of the individual is not fixed in the fertilized egg, but gradually works itself out during development as one or a few pathways out of many possible ones are followed.

Flexibility also exists in the course followed by a genetic constitution in its passage from generation to generation. The gene for sickle-cell anemia faces one set of probabilities in an environment in which malicious malaria is hyperendemic, namely to increase in frequency up to an equilibrium. In the absence of malaria, it tends to decrease to a lower equilibrium value. Approach to equilibrium in both cases will be influenced by such social factors as degree of inbreeding in the population, which depends partly on its size and its isolation from other populations, as well as on medical, public health, and educational facilities, and also on ease of transport.

The effects of the gene in the individual and in the population are not inevitably guaranteed, otherwise there would have been no evolution.

Similarly if we fix our attention on single genes or single disease entities, we shall miss another lesson from the experiences of geneticists that may be useful in considering sociocultural factors in disease. It has become a reasonable view that natural selection tends to mold complexes of genes, comprising perhaps large fractions of the total genotypes into coadapted more-or-less integrated systems. In the process of adaptation to the environment, a unit difference like the allele for sickle-cell hemoglobin may play a predominant role but rather as a differential in a complex than as an isolated element. In a malarial environment, with strong selective forces, residual genotypes might well be evolved which differ from those in a nonmalarial environment; similarly since the serological incompatibility between parents in the ABO blood group system protects their children against the effects of incompatibility in the RH system, the effects of selection on either one depend jointly upon both systems.

The maladjustment to the environment that expresses itself in organic disease usually involves both the genetic constitution that affects the response of the organism and the conditions to which it responds. Analysis of the constitution into genetic elements was a necessary step in appreciating the nature of the complexity of the responding system. On this can now be built a more synthetic view of organisms as functioning wholes, subject to disharmonies introduced by variations in them, such as mutations, that have not yet achieved adjustment or integration through natural selection.

These ideas are commonplace in genetics, but have not yet received the attention they deserve in the study of human populations. In man, the social and cultural milieu provides an important part of the environment in which human evolution occurs. It provides problems of special, almost of unique, interest to which increasing attention should be given. Perhaps this monograph will provide some guide lines in this direction.

Part I. Sociocultural Factors in Chronic Organic Disease

THE ECOLOGY OF HUMAN DISEASE

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A famous French playwright once quipped: "A healthy person is nothing but an unrevealed patient." I have a great fondness for this definition, and I think there is much more to it than meets the eye. I like it because it stresses the fact that what we call health is nothing but a struggle between mysterious forces that occur below the horizon. Nothing happens in the visible field that does not stem from deep, invisible, and unknown roots. It has been said that one of the traits that distinguishes man from animals is that man suspects there is another value to the appearance of what he observes. A second reason I like this definition is that it mentions the hidden traits that the challenges of the environment may cause to be revealed in a person when he becomes a patient. We shall see a little later that these hidden traits that really stem from the genetic make-up of the patient are of great importance in our understanding of the ecology of disease and have been far too often neglected in the past in favor of what is merely visible. Thus the French playwright's remark implies that some day the challenges of the environment will reveal the strength and the weakness of the person and give us a measure of his ability to adjust to this environment.

The adjustment of man to the world around him is the study that should interest physicians more than it has in the past. If only patients were to read this paper there would be no need for me to give a definition of disease. However, readers will include physicians also, and I know that physicians are in great need of such a definition.

Disease is that alteration of living cells or tissues that jeopardizes survival in their environment. I like this definition not only because I think I have coined it but also because it introduces the idea of the *environment* in any concept of disease. Indeed the environment is extremely important since one phenomenon that may appear to be disease in one place is not the case in another place. When we find eight or nine million red cells per cubic millimeter in the people living on the highest plateaus of the Andes, we do not consider this pathological because it helps them to survive in that particular environment. If we should make the same observation at sea level, however, we might worry whether this would not overburden the tissues with oxygen, and it might be considered pathological. In the same way an aggressive, mentally ill patient would be more readily acceptable in the environment of a large farm of the Midwest than in a two-and-one-half room apartment on the east side of Manhattan.

This definition stresses as its criterion *survival*, which is, of course, the basic dynamic force of any living thing. I believe it is better to define disease in terms of survival than to define it in terms of health, since health is also a very relative concept. Finally, I think this definition is an opportune reminder that there is no function without structure. It places the phenomenon of disease in the tissues, where it belongs. We have heard so much in the past 50 years of so-called purely functional diseases, and much time has been wasted in discussing this without referring to the indispensable basis for any function, which is structure. A structure may be nothing more than a cell built around a few molecules, but it is a structure nevertheless. If we remind ourselves that there is no function without structure, most of the discussions about dysfunctions become idle if they are not supported by careful scrutiny of the underlying structure.

Having now defined disease let us explore a bit further and try to find out how disease occurs. This should seem to be a rather simple undertaking. While everybody believes he has a good conception of disease and how it occurs, I do not think our thoughts are as clear on the subject as they ought to be.

Disease, any disease—and let me remind you that by disease I mean maladjustment to the environment—can never occur without the combination of three orders of factors converging in time and space, that is, there must be stimuli from the environment, there must be responses from a host, and there must be the conglomeration of thoughts and traits that we call culture. In order to understand disease and maladjustment, let us review these three orders of factors in succession.

The stimuli from the environment can be classified into physical stimuli, biological stimuli, and emotional stimuli. Of course these three classes of stimuli interpenetrate each other, and this is only a convenient way of presenting the subject. Strangely enough we know very little of the real effect of physical stimuli on man. It has always been extremely difficult in the past to dissociate what is really the action of climate from the action of the biotics that occur in these climates. Some time ago Douglas Lee built up an interesting curve showing the combinations of temperature and humidity that result in comfort and well-being in most human individuals. Below or beyond certain areas on the curve, physical stress occurs that may eventually lead to death. Except for these computations little else is known. We can assume only that unchartered forces occur that are specific to certain areas on the surface of the earth that must have an enormous importance in eliciting survival-worthy responses from, or on the contrary, cause the detrimental alteration of living tissues. For example the so-called solar flares that we know can disturb electronic communications on the surface of the earth are probably not ineffective in disturbing electronic communication inside the tissues. At least it seems to me that it would be improvident on our part not to give them some credit and to explore these new stimuli from the point of view of their action on man. We know very little about the forces that combine to create the climate at any given point of the earth and about their effect on living things, man, and the surrounding biotics upon which man is so very dependent in so many ways.

If we now consider the action of these biotics, their challenges are numerous and, of course, much better known. I go as far as to say that my generation has been quite guilty in giving them primordial importance in our concept of disease. I think that we have been very near to committing the major sin in disease etiology, that is, to consider that what we call disease may have a single cause. There is no such thing. A multiplicity of causes are always needed to produce that alteration of tissues creating maladjustment. These biotics, many of them more or less harmful parasites of our tissues, live in very definite environments of which we know little; their ecology is of great importance in our understanding of transmissible diseases. Last but not least we must always remember that these biotics live in societies like all living things, and that this social structure of very small or very large living objects dominates the picture. An example of this could be given by a study of what happens when we introduce *Penicillium notatum* or streptomycin into a society of bacteria.

In the same way that I gave to physicians my definition of disease, I think I should give to social scientists my concept of society. From the ecologist's point of view society is an organization of living things based on a pattern of mutual tolerance that occurs for a brief period of time after the dynamism of reciprocal exclusion has been temporarily exhausted. If we accept the idea that this is at least one aspect of what we call society, it is no wonder that every single unit living under such a climate will experience considerable stresses. By this I mean that stressful situations will occur and that, depending upon the host, these stressful situations may or may not translate themselves into actual physiological stress. Thus we have a brief sketch of the environmental stimuli that make up one third of the factors needed to produce that alteration of tissues that we call disease.

The second term of this equation is the host. I stress that I think this subject is the field of the future. Our forefathers had a good awareness of the importance of the individual, which they called "the terrain," in shaping the clinical forms of disease. Following the enlightening Pasteurian discoveries we have been mesmerized by the action of a single stimulus to produce disease, and have forgotten completely to explore the reasons that make the host respond in the way he does.

One of the fondest memories I have of my early days at medical school is that of my bewilderment when a professor of bacteriology told us that it was impossible to inoculate leprosy into animals and, vice versa, that certain bacteria that found themselves quite at home with animals could not, if inoculated into the human system, produce the symptoms that were observable in animals. Although I did not realize it at that time, this introduced the very potent idea of the genetic make-up of the host, and its importance in the kind of responses offered to environmental stimuli by the host. It is as though I had on a table three dolls, one of glass, another of celluloid, and a third of steel, and I chose to hit the three dolls with a hammer, using equal strength. The first doll would break, the second would scar, and the third would emit a pleasant musical sound.

This concept should never be forgotten (1) when we study the occurrence of transmissible diseases and the response of populations to the biological stimuli mentioned above; (2) when we study degenerative diseases and the response of individuals to the absorption of certain foods and poisons; and (3) when we study the so-called field of behavioral disorders in which we have had such a great tendency in the past to limit our investigations to stimuli, completely neglecting the more important host and the reasons for his responses.

In recent years we have learned to recognize the importance of certain blood groups, meaning certain genes, in increasing or diminishing our susceptibility to such diseases as duodenal peptic ulcer or carcinoma of the colon. We have learned the importance of the type of hemoglobin possessed by certain persons in relation to their susceptibility to malaria. We have begun to understand, as L. C. Dunn points out in his "Introductory Remarks," the role played in evolutionary processes by these genetic susceptibilities. We must now forge ahead in this field and try to map the various susceptibilities of the human host to the long list of known environmental challenges. This seems to me to be one of the most fascinating fields of the future.

The third order of factors that plays an important role in shaping disease patterns is, of course, culture. In the same way that I felt I should give a definition of disease to physicians and of society to social scientists, I owe to the anthropologists my definition of culture. Culture to me, as a disease ecologist, is the sum total of the concepts and techniques used by individuals or populations to control the environment in which they live. Of course, a culture trait may not always be survival-worthy, that is, may not promote survival. It may be erroneously conceived. It may have been received traditionally from ancient generations who had conceived it at a time when it had a purpose in a different environment, and may have been carried over faithfully throughout the centuries. Be that as it may it is useful for the disease ecologist and the public health worker to consider cultural traits observed in different populations as either promoting or preventing the survival of these populations. The sanitarian does not find it necessary to pass on the historical origin of these traits. He merely has to say whether the trait brings together the stimulus and the host or whether it keeps them apart. There are traits that do both, and they can be considered ambivalent. The revolting habit of smoking, now deeply ingrained in our society, may on the one hand precipitate death by cancer of a significant number of our population, while at the same time promoting survival if it soothes peoples' nerves to the point where it prevents them from rushing at each other's throats under the social emotional stresses alluded to previously. This role of culture as either a link between stimulus and host or a wall between them is, I think, a capital one.

A small Chinese village that I knew three decades ago may illustrate this linkage. To the epidemiologist, a puzzling problem was offered. One half of the inhabitants of this village were literally decimated by a very heavy hookworm infestation, while the other half enjoyed good health, at least from that point of view. An exploration of the local cultures revealed that almost all the patients were rice growers, while the healthy people bought their rice and had nothing to do with its cultivation. It was further found that the rice growers spent all their working days knee deep in mud thoroughly mixed with night soil which, of course, explained the introduction through skin penetration of the hookworm larvae. The healthy part of the population was engaged in silkworm farming, and spent their working days on ladders tending the mulberry trees.

In northern Vietnam many interesting situations, illustrating the role of culture in the disease patterns, occur. The country, from a geomorphological point of view, may be considered as composed of two parts: (1) a very fertile delta and (2) a much less fertile hill region. In the delta rice is grown. In the hill region some rice is grown, but there is considerable forest cover, and lumber is abundant. These are not the only two reasons for the differences in culture, but they are important nevertheless. As a result of these two situations the people of the delta build their houses on the ground. They have their stables on one side of the house and their kitchen on the other. Meals are brought into the house after they are cooked. The people in the hills, on the other hand, build their houses on stilts, and their living rooms usually are located about eight to ten feet above the ground. They keep their animals under the houses, and they do their cooking in the living rooms, which are usually full of smoke.

It happens that a very fierce malaria vector, *Anopheles minimus*, is found in the hill region, but the flight ceiling of this vector seldom exceeds nine to ten feet of elevation, so that during its flight it encounters only the animals under the houses. The fumes that emanate from the living rooms, where the people congregate, play a role in driving away any mosquitoes that might find themselves up there.

In the delta, on the contrary, there is no such malaria vector. When the people from the delta, under the economic pressure of overpopulation of the fertile land, seek relocation in the hills where space is more abundant, they take with them their delta culture. They build their houses on the ground floor, keep their animals outside, and see that their living rooms are free of smoke by cooking their food outdoors. As a result *Anopheles minimus*, which prefers human blood when it has a choice, becomes an active transmitter of malaria, and the people of the delta have become discouraged from participating in relocation schemes, feeling that there are evil spirits in the hills that do not like the delta people.

In the Vietnam delta itself we are confronted with three dominating factors: (1) the waters; (2) the aquatic life the waters cause to exist; and (3) the rice the waters help to grow. The water, represented chiefly by the Red River, is an important factor in the local culture. The mighty river not only has deposited its alluvial soil on the fields but continues pouring it deep into the China Sea. As a result the coastal population has developed no interest in sea fishing, the sea waters being too shallow and there being no fish along the coast. The Red River, fed by the snows and the rains of the eastern ranges of the Himalayas, has a shifty course, and it is very hard to predict its location for the next year. In addition to this it is subject to sudden rises, and the problem of flood control has been a major one in the area for centuries. Dams have been built for the triple purpose of protection, irrigation, and drainage. This has resulted in two important phenomena. The harvest does not occur at the same time in all parts of the delta, and repairs to the dams cause the necessity for a migrant labor force to rush where needed to keep the waters under control.

These dams have created conditions in which aquatic vegetation, snails, crayfish, and other biotics abound. Crayfish form an important item in the diet of the people.

From the waters the people also get their water-borne diseases, such as cholera, the dysenteries, and the typhoid fevers. From the migration of the labor force they get the pattern of these diseases that are transmitted from one point to the other by the migrant worker moving around wherever the need for his labor arises. From the snails they get their *Schistosoma japonicum*; from the aquatic vegetation, crayfish, and other biotics, they get their paragonimiasis and clonorchiasis.

However, from these soils and waters they also get their rice, which they prefer white and well polished. The polishing of the rice is done by machines in the more advanced villages. In the more backward villages it is done by mortar and pestle. As a result, the advanced villages get more beri-beri, while the backward villages get less, since hand polishing removes less of the thiamin-rich husk than does machine polishing.

All over the world numerous examples of the close interrelationship of culture and disease patterns could be given. As a result of the above I may say that the old art of reading symptoms and treating them by what appears to control them best is disappearing fast. The ancient formula of one ill, one pill, one bill, which seems to have been the credo of physicians for many generations, should be abandoned. Disease is a biological expression of maladjustment. This is what should be taught to our students in medical school, and this phenomenon against which they are going to fight all their lives cannot be understood without an ecological study in depth that should give equal importance to the three approaches: the environment, the host, and the culture.

SOCIOCULTURAL FACTORS IN CANCER IN HAWAII

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Hawaii is a community of more than 600,000 people located on seven major islands in the Pacific Ocean about 2400 miles from the coast of California. Its population is made up of approximately 35 per cent Japanese, 23 per cent Caucasians, 18 per cent Hawaiians and part-Hawaiians, 12 per cent Filipinos, 6 per cent Chinese, and 6 per cent others, such as Koreans, Samoans, and Puerto Ricans.[1] In discussing ethnic differences, comparisons will be made primarily among the three major groups, that is, Japanese, Caucasians, and Hawaiians and part-Hawaiians. However in some instances for special reasons other ethnic groups will be included.

Cancer Frequency

Cancer frequencies in Hawaii are unusual as compared with those in other states because of ethnic differences in certain Hawaiian population types. Most of the following conclusions are based on studies of hospital records covering the 11-year period from 1944 to 1954:[2]

(1) Japanese have cancer of the stomach more frequently than any other ethnic group. This is shown in TABLE 1, which includes statistics from 8 years of the 11-year study mentioned above. It will be noted that stomach cancer is about 2½ times more frequent in Japanese men than in Caucasian men, and that this type of cancer is considerably more frequent in Japanese men than in Hawaiian and part-Hawaiian men. A comparison of the female rates for cancer of the stomach shows that Japanese women have a rate about twice that of Caucasian women and about 2½ times that of Hawaiian and part-Hawaiian women.

Several workers have studied ethnic differences in stomach cancer and agree essentially with the above findings. McClanahan *et al.*[3] analyzed cancer-of-the-stomach case records of Japanese and other racial groups treated at the Queen's Hospital in Honolulu. Steiner[4] studied 32,293 necropsy records at the Los Angeles County Hospital, which included 741 cases of gastric cancer. Steiner also reported that Nagayo found that gastric cancer comprises 42.8 per cent of all carcinomas in a necropsy series at the Pathological Institute of Tokyo Imperial University, and that similar high necropsy findings for this type of cancer have been reported from other Japanese cities. Other Japanese scientists have now confirmed Nagayo's findings that cancer of the stomach is the most frequent type of cancer found in men in Japan.[5]

In 1951 Strode[6] reported on 500 patients who had stomach operations performed by him in Hawaii. He concluded that operations for gastric cancer were twice as frequent among Japanese as in other ethnic groups. Rhea[7] studied deaths in Japanese males 45 years of age and over in Hawaii and reported that they have a significantly higher mortality rate from gastric cancer than non-Japanese males of the same age group. We[8] reported on 3257 cases of cancer, which included 565 persons who had carcinoma of the stomach.

The following conclusions were reached. In percentage of total cases, Japanese men had about twice as much gastric cancer as Hawaiian and part-Hawaiian and Caucasian men. About the same proportion held true for women of these three racial groups. Gastric cancer, however, by percentage was more than twice as frequent in men as in women. The incidence rates of gastric cancer in this same group showed that the Japanese male rate was considerably greater than the male rate for all races and the male rate for Caucasians specifically, as well as the male rate for Hawaiian and part-Hawaiian groups.

TABLE 1

ETHNIC AND SEX DIFFERENCES IN THE INCIDENCE OF STOMACH CANCER

Territory of Hawaii, 1947 to 1954

Ethnic group	Cases		Rates*	
	Male	Female	Male	Female
All races	440	183	31.6	17.1
Hawaiian and part-Hawaiian	48	31	37.9	15.5
Caucasian	53	31	18.7	11.0
Chinese	16	8	12.3	9.6
Japanese	274	107	48.6	22.6
Filipino	15	1	4.5	6.1
Other	34	5	39.3	15.3

* Rates per 100,000 population adjusted for age to total United States population for 1950.

TABLE 2

ETHNIC DIFFERENCES IN THE INCIDENCE OF PRIMARY CANCER OF THE LIVER

Territory of Hawaii, 1944 to 1954

Ethnic group	Cases		Rates*	
	Male	Female	Male	Female
All races	54	8	1.9	0.3
Hawaiian and part-Hawaiian	9	1	1.9	0.2
Caucasian	4	1	0.8	0.2
Chinese	3	2	1.6	1.2
Japanese	10	4	1.0	0.4
Filipino	25	—	5.3	0
Other	3	—	2.6	0

* Rates per 100,000 population based on population for 1950.

(2) Primary cancer of the liver has been found to be most frequent in Filipino men. During the previously mentioned 11-year period between 1944 and 1954, 62 primary cancer-of-the-liver cases were admitted to Hawaii's hospitals.[2] A breakdown of these 62 cases by ethnic group and by sex will be found in TABLE 2. It will be noted that 25 of these 62 cases (over 40 per cent) were in Filipino men despite the fact that Filipinos make up only 12 per cent of the population of Hawaii. Japanese men have only 10 cases, or a little more than 16 per cent of the total, whereas Caucasian men have only 3 cases, or about 5 per cent of the total. Hawaiian and part-Hawaiian men have 9 cases, or

about 14.5 per cent of the total. It will be noted that the incidence rate for Filipino men is more than three times that for all males, and also three times the Hawaiian and part-Hawaiian rate, more than five times the Japanese rate, and more than six times the Caucasian rate. Women in all major ethnic groups have considerably lower rates than men, but no racial differences have been determined.

It has been known for many years that primary cancer of the liver has a peculiar geographic distribution. It is unusual in Europe and the United States, but is considered quite common in some parts of the world, such as Malaya and South Africa.[9] Marnie[10] has emphasized that certain racial groups in Hawaii are particularly susceptible to primary hepatic malignancy. We[8] showed in an earlier report that Filipinos in Hawaii had a rate for primary cancer of the liver that was much higher than that of any other ethnic groups and more than twice the rate of males of all races.

TABLE 3
ETHNIC DIFFERENCES IN THE INCIDENCE OF LUNG AND BRONCHUS CANCER IN MALES
Territory of Hawaii, 1947 to 1954

Ethnic group	Cases	Rates*
All races	203	14.3
Hawaiian and part-Hawaiian	27	19.9
Caucasian	54	19.6
Chinese	15	12.5
Japanese	68	11.8
Filipino	24	7.7
Other	15	19.0

* Rates per 100,000 population adjusted for age to total United States population for 1950.

(3) Japanese men have a lower incidence of lung cancer than the Caucasian and Hawaiian and part-Hawaiian men. This will be noted in TABLE 3.

In a previous study Quisenberry *et al.*[8] studied 205 cases of bronchogenic carcinoma, and it was pointed out at the time that cancer of the lung does not have nearly the frequency in Hawaii that it now has in the mainland United States. A comparison of the three major ethnic groups showed that Hawaiian and part-Hawaiian males had the highest percentage of lung cancer of any ethnic group. Caucasian males were next, and Japanese males had the lowest percentage. The incidence rates probably gave a more accurate picture. These showed that Caucasian males had a significantly greater rate than males as a whole and a considerably higher rate than Hawaiian and Japanese males. It was interesting to note in this study that the female rates for all races were low and there were no significant ethnic differences.

(4) In TABLE 4 it will be noted that Caucasian women have cancer of the breast most frequently, while Japanese women have a rate that is between one fourth and one fifth the Caucasian rate. The Hawaiian and part-Hawaiian rate falls in between those two.

In 1938 Tilden[11] reviewed 66 cases of cancer of the breast and 6 borderline malignancies treated at the Queen's Hospital in Honolulu between 1922 and

1936. He found that 64 per cent of those patients were Caucasian, 18 per cent were Hawaiian and part-Hawaiian, and only 7 per cent were Japanese. His conclusion from that study was that breast cancer was less common in Japanese women than in women of other races. Quisenberry *et al.*[8] reported in 1954 on 289 cases of breast cancer studied in Hawaii. It was shown that Caucasian women had an incidence rate of 33.5 per 100,000; Hawaiian and part-Hawaiian women had a rate of 11.5; and Japanese women, a rate of only 7.

TABLE 4
ETHNIC DIFFERENCES IN THE INCIDENCE OF BREAST CANCER
Territory of Hawaii, 1947 to 1954

Ethnic group	Cases	Rates*
All races	317	26.9
Hawaiian and part-Hawaiian	54	35.3
Caucasian	156	50.1
Chinese	27	29.7
Japanese	60	11.1
Filipino	12	21.6
Other	8	17.6

* Rates per 100,000 population adjusted for age to total United States population for 1950.

TABLE 5
ETHNIC AND SEX DIFFERENCES IN THE INCIDENCE OF LARGE-INTESTINE CANCER
Territory of Hawaii, 1947 to 1954

Ethnic group	Cases		Rates*	
	Male	Female	Male	Female
All races	150	130	10.5	12.4
Hawaiian and part-Hawaiian	14	10	10.1	5.9
Caucasian	50	67	18.6	24.4
Chinese	19	13	20.5	16.4
Japanese	56	32	10.0	6.4
Filipino	9	3	4.0	10.0
Other	2	5	1.0	12.1

* Rates per 100,000 population adjusted for age to total United States population for 1950.

For all racial groups the incidence rate of breast cancer was 14.3 per 100,000 population. T. Hirayama (personal communication) has shown that the death rate of breast cancer for Japanese women is about three times higher in Hawaii than in Japan.

(5) In TABLE 5 it will be noted that cancer of the large intestine is considerably more frequent in Caucasians than in other ethnic groups. The Japanese and Hawaiian and part-Hawaiian female rates are only about one fourth the rate for Caucasian women. Among males the Caucasian rate is almost twice that of the Japanese and Hawaiian and part-Hawaiian groups.

(6) Cancer of the prostate gland is about nine times more frequent in Cau-

casian men than in Japanese men. The rate for Hawaiian and part-Hawaiian men is over four times that of the Japanese group. These comparisons are shown in TABLE 6.

(7) Cancer of the nasopharynx has been found to be most frequent in Chinese people in Hawaii. Because Chinese make up only 6 per cent of the total population, no effort has been made in our studies to compare their incidence with rates in the three major ethnic groups. However, in an analysis conducted by Pang[12] 76 per cent of the nasopharynx cancer cases seen were Chinese, whereas Japanese made up only 6 per cent of the cases, and 3 per cent were Caucasians. Data from this study are shown in TABLE 7.

TABLE 6
ETHNIC DIFFERENCES IN THE INCIDENCE OF PROSTATE CANCER
Territory of Hawaii, 1947 to 1954

Ethnic group	Cases	Rates*
All races	99	7.8
Hawaiian and part-Hawaiian	12	12.2
Caucasian	54	25.4
Chinese	7	4.4
Japanese	17	2.8
Filipino	7	2.7
Other	4	4.8

* Rates per 100,000 population adjusted for age to total United States population for 1950.

TABLE 7
ETHNIC DIFFERENCES IN THE FREQUENCY OF CARCINOMA OF THE NASOPHARYNX[12]

Ethnic group	Cases	Percentage
All races	34	100
Chinese	26	76
Filipino	4	12
Japanese	2	6
Korean	1	3
Caucasian	1	3

(8) Cancer of the uterine cervix has been found to be most frequent among Hawaiian and part-Hawaiian women. The rate for this group is about 1½ times that of Caucasian and Japanese women. Statistics showing this will be found in TABLE 8.

(9) Allison[13] has shown that skin cancer is about 45 times more frequent in Caucasians in Hawaii than in Orientals; it is unusual in Hawaiian people, but may be found in Hawaiian-Caucasians. Allison has also shown that the rate for Caucasians in Hawaii is considerably higher than the rate for Caucasians in selected areas of the mainland United States. Some statistics from that study are shown in TABLE 9.

Possible Sociocultural Factors

Stomach. There are probably many sociocultural factors that play a part in the high incidence of stomach cancer in Japanese. Some of these are being studied at the present time (TABLE 10). It has been known for many years that Japanese men usually eat while their food is very hot. This may play a part in the production of cancer of the stomach. It is also believed that Japanese men drink more alcoholic beverages than do Japanese women. It is also thought that Japanese men have more psychosomatic problems than do Caucasians or Hawaiians and part-Hawaiians. J. E. Strode (personal communication) has shown that the incidence of benign ulcers in Japanese men is 1½ times higher than it is among Caucasian men in Hawaii. Segi[14] states: "Most Japanese scholars believe that stomach cancer often has an etiologically close association with stomach ulcer. Researchers in other countries usually

TABLE 8

ETHNIC DIFFERENCES IN THE INCIDENCE OF UTERINE CERVICAL CANCER
Territory of Hawaii, 1947 to 1954

Ethnic group	Cases	Rates*
All races	278	22.4
Hawaiian and part-Hawaiian	61	31.6
Caucasian	69	19.6
Chinese	24	24.4
Japanese	97	19.4
Filipino	10	16.3
Other	17	36.7

* Rates per 100,000 population adjusted for age to total United States population for 1950.

TABLE 9

SKIN CANCER CASES AND RATES PER 100,000 POPULATION BY RACE
Honolulu County, 1955 and 1956[13]

Ethnic group	Cases	Rates
Caucasian	276	138
Non-Caucasian	17	3.1
Korean	2	17.8
Chinese	3	4.8
Japanese	9	3.5
Hawaiian and part-Hawaiian	2	1.6
Filipino	1	1.4

TABLE 10

EPIDEMIOLOGICAL STUDY OF GASTRIC CANCER
(Areas Included)

(1) Dietary and nutritional factors
(2) Oral health
(3) Occupational history
(4) Possible emotional factors
(5) Hereditary influence
(6) Microscopic and macroscopic studies
(7) Gastritis and polyps as precancerous conditions

do not agree with this opinion." Oriental people, especially Japanese, are usually considered very stoical. This has been part of their culture and teaching for many years. They are the type who seldom complain and have good self-control. It is quite generally accepted that emotional factors play a part in the production of benign ulcers of the stomach. Ivy[15] has suspected worry in the etiology of gastric cancer.

The part that may be played by diet and nutrition in the epidemiology of gastric cancer has not been definitely determined. Many Oriental people in Hawaii, especially the older ones, eat diets peculiar to their own ethnic groups. This is probably more particularly true of Japanese than it is of others. Japanese in Hawaii eat large amounts of white rice, which is low in vitamin B_1, and they eat raw fish, which has been shown to contain thiaminase, which inactivates vitamin B_1.[16] It has been shown that people who consume large amounts of carbohydrate need a vitamin B_1 intake higher than the average.[16] Tea, which is very hot, is usually taken with the rice and fish, and at times hot saké is also consumed. Relishes made from vegetables are often eaten with the other foods. This diet, which contains little protein other than fish, is quite popular among the older Japanese. Younger Japanese usually eat more vegetables and meat than do the older people.

Ivy found that some people consume food and drinks so hot that injury to the stomach may be produced.[15] On the basis of this finding and because cancer may occur in burn scars of the skin, Ivy believes that hot food and drink should be suspected in the etiology of stomach cancer.

Wynder[17] believes there is evidence that would link Plummer-Vinson's disease (primarily a chronic iron deficiency) to cancer of the alimentary tract. He states that, in addition to iron deficiency, deficiencies of other nutrients may be of additional importance.

The primary factors, then, in so far as diet and nutrition are concerned in gastric cancer, may be the low vitamin B_1 intake, low protein consumption, and interference with iron metabolism. The heat of food and drink may also be important. These are tied in with the sociocultural background of the individual.

A high percentage of Japanese men in Hawaii are in occupations where they are exposed to insecticides, weed killers, and rodenticides. It may be possible to study the part played by these substances in the etiology of gastric cancer. In studies we have conducted an attempt has been made to determine whether chemicals that could be irritating to the stomach might enter the body through either the nose or mouth and eventually reach the stomach.

Liver. The reasons for the high incidence of cancer of the liver in Filipino men are not clear. However, it is believed that the diets of Filipino men are higher in carbohydrates than the diets of other men in Hawaii. The diets of the Filipinos may also be low in protein as well as low in vitamin B_1. It is also possible that Filipino men are exposed to chemicals in their work that may cause irritation to the liver.

Filipino men have been imported into Hawaii for working on the sugar plantations. Since most of them came without their wives they live alone and do much of their own cooking. They eat large amounts of white rice and fish; the fish is usually cooked, but there is very little animal protein other than fish in the diet.

Lung. Japanese men have probably smoked fewer cigarettes than have Caucasians in Hawaii. There is probably this same difference between Japanese men and Hawaiian and part-Hawaiian; however, it is believed that cigarette smoking is becoming more common among Japanese. This should be studied.

Breast. Japanese women in Hawaii have been slower in giving up the nursing of their children than have the Caucasian and Hawaiian and part-Hawaiian women. This probably accounts at least in part for the low incidence of cancer of the breast in Japanese women. MacDonald[18] studied the records of 2636 women who had breast cancer and concluded that the increasing incidence of breast cancer in "civilized" women may be due in large measure to complete or partial failure of lactation and that a full period of lactation in child-bearing women seems to offer a degree of protection against the development of breast cancer.

T. Hirayama (personal communication) has found that caressing of the breast apparently protects against cancer. This was shown by interviewing cancer cases and controls in Japan. He has also stated that, "Breast cancer in Japan seems to be more common in women living in western style." In a study which he carried out in Tokyo in 1950–1952, he found an excess occurrence of breast cancer among women of professional occupation as compared with other women.

Graham *et al.*[19] have shown an increasing incidence of breast cancer with increasing socioeconomic status.

Large bowel. The dietary habits and perhaps the bowel habits of Caucasians and Japanese are different. There is probably less constipation among Japanese women and Hawaiian and part-Hawaiian women than among the Caucasians. This may be due to the difference in dietary habits and to the consumption of more bulk by the Japanese and Hawaiians. The sociocultural factors that may be responsible for the difference in the incidence of large-intestine cancer in the different ethnic groups are not apparent and should be studied.

Prostate. The reasons for the great variance in incidence of prostatic cancer between Japanese and Caucasian men may be related to differences in the love-making and mating habits of the two ethnic groups. Necking and petting, which have been prevalent for many years among Caucasian young people, have not been part of the Japanese culture. Exhibits of love-making, such as kissing in public, have been prohibited. Japanese movies until recently would not show kissing or even holding of hands. However, in recent years authorities have permitted the showing of an occasional kiss and the holding of hands between men and women. The older Japanese have opposed this change. In the mating process, preparation for the sex act has probably not been frustrated as frequently among Japanese as among Caucasians. Once the process is started among Japanese, it is more commonly culminated in sexual intercourse. This should prevent the frustration of glandular mechanisms and thus avoid engorgement, which may occur if the love-making does not lead to intercourse. It may be postulated that this frustration and engorgement play a part not only in the etiology of prostatic cancer but also in breast cancer, since this type is also very closely related to the functioning of the sex glands and of the endocrine system as a whole.

Nasopharynx. The reasons for the high incidence of cancer of the nasopharynx in the Chinese have not been clarified. It is possible that irritation of this part of the throat, mouth, and nose from hot liquids such as tea may play a part. On the other hand it would be supposed that other Oriental groups drink large amounts of hot tea and would also suffer from this condition to the same degree. This needs much more study from the sociocultural standpoint.

Pang[12] stated that all of his cases (referred to above) were from South China, and that otolaryngologists from China have stated that carcinoma of the nasopharynx does not occur as frequently among Northern Chinese as in persons from South China. No explanation has been found for this regional difference.

Uterine cervix. The exact social or cultural factors that may play a part in the high incidence of cancer of the uterine cervix in Hawaiian and part-Hawaiian women have not been determined. However, Hawaiian and part-Hawaiian women are considered to be phlegmatic. In addition they probably do not receive as good medical care following their pregnancies as do Caucasian and Japanese women, simply because they do not seek postnatal care and do not follow their physicians' advice. They also usually have large families: the average Hawaiian family consists of six persons while the average family for all ethnic groups in Hawaii consists of four.[20]

Skin. The high incidence of skin cancer among Caucasians is probably due principally to the lack of pigmentation of the skin as compared with the Oriental groups. Extensive sun bathing has been more popular among Caucasians than among Orientals. Older Japanese women, for example, would not expose their bodies to the sun nor to the view of the public.

Sociocultural Factors Changing

Some of the ethnic differences in the frequency of cancer may disappear with the integration of the different racial groups in Hawaii. The changes may bring about either lower or higher incidences of cancer; for example, we do not know what will happen to the high incidence of cancer of the stomach in Japanese men as they eat a diet more and more like the Caucasian diet. Perhaps it will produce a lower incidence of the disease.

Cancer of the breast seems to be increasing in Japanese women. This may be caused partly by their nonnursing of children. It is evident that they are giving up the nursing of children and becoming more like Caucasian women in this regard. There may be other factors involved such as the change in the love-making and mating habits of Japanese people to the Caucasian pattern. If this is a factor then there may be an increase in breast cancer along with an increase in prostatic cancer.

As time goes on the diet of Filipino men will probably become more similar to that of the Caucasian and other ethnic groups. The Filipino men are now marrying, in some instances bringing over Filipino women from their homeland, and will probably change their diet because they are not living alone.

Whether these factors will bring about a lowering of the incidence of primary cancer of the liver in this group cannot be determined as yet.

Japanese men probably smoke more cigarettes now than formerly. It is impossible to say whether they are smoking as much as Caucasians since this has not been studied. It is expected that this type of cancer will increase in Hawaii as it has in other parts of the United States.

As the diets of all ethnic groups in Hawaii become similar, it is to be expected that cancer of the large intestine will be reduced in Caucasians or increased in Orientals, and thus they would become more similar in regard to the incidence of this type of cancer. However, there is no indication of this now.

Since nothing is really known about the sociocultural factors that may play a part in the high incidence of cancer of the nasopharynx in Chinese, no statement can be made regarding changes that may be expected in this type of cancer.

It is believed that Hawaiian and part-Hawaiian women are becoming more concerned about their health and more conscientious about medical care, and this should cause a reduction in the incidence of cancer of the uterine cervix. Their rate should come close to that of the Japanese and Caucasian women. They may also reduce the size of their families.

There may be a change in the incidence of skin cancer as a result of the integration of the different groups. It has been known for a long time that persons with dark pigmentation of the skin have a lower incidence of skin cancer than do people with lighter colored skin. The intermarriage of the ethnic groups should cause a lowering of the incidence of this type of cancer.

Graham *et al.*[19] have shown an increasing incidence of stomach, liver, and lung cancer in men with decreasing socioeconomic status. They also showed an increasing incidence of stomach, liver, and cervix cancer in women with decreasing socioeconomic status. As stated earlier they also noted an increasing incidence of female breast cancer with increasing socioeconomic status. No attempt has been made in this report to relate ethnic differences or sociocultural factors to socioeconomic status. This should be done in future research.

Summary and Conclusions

(1) The incidence of stomach cancer in Hawaii is highest among the Japanese. There are, no doubt, many sociocultural factors such as dietary habits that play a part in causing this.

(2) Primary cancer of the liver is most frequent among Filipino men. Filipino men probably have diets higher in carbohydrates and lower in protein and vitamin B_1 than those of other ethnic groups.

(3) Japanese men have the lowest incidence of lung cancer in Hawaii. They may have smoked fewer cigarettes for fewer years than have Caucasian men.

(4) The Caucasian breast cancer rate is almost five times the Japanese rate. Japanese women have been slower in giving up the nursing of children than have Caucasian women. There are, no doubt, other sociocultural factors involved.

(5) Cancer of the large intestine is more frequent in Caucasians than in other ethnic groups. The dietary habits and perhaps the bowel habits of Caucasians and Japanese are different.

(6) Cancer of the prostate gland is about nine times more frequent among Caucasian men than among Japanese men. The sociocultural factors that may be responsible for this great variance in incidence may be related to differences in the love-making and mating habits of the two ethnic groups.

(7) Cancer of the nasopharynx is most frequent among the Chinese. It is possible that there is irritation of the nasopharynx among the Chinese from hot liquids, such as tea. However, this does not explain the lower incidence in other Oriental groups.

(8) Cancer of the uterine cervix is most frequent among Hawaiian and part-Hawaiian women. Hawaiian women probably do not receive as good care following pregnancies as do women of other ethnic groups. They also have larger families than other groups.

(9) Skin cancer is most frequent among Caucasians. This is probably due more to differences in skin pigmentation than to sociocultural factors.

(10) Sociocultural factors are changing in Hawaii with the integration and intermarriage of the different ethnic groups. These changes may bring about either lower or higher incidences of certain types of cancer.

References

1. HAWAII STATE HEALTH DEPARTMENT. 1958. Estimates made by the Office of Health Statistics. Honolulu, Hawaii.
2. BUREAU OF CANCER CONTROL. 1944–1954. Department of Health, Territory of Hawaii. Cancer Morbidity Study. Hawaii.
3. McCLANAHAN, B. J., J. A. MITCHEL & H. E. MILLIKEN. 1948. Carcinoma of the Stomach in Hawaii. A Review of 121 Gastric Lesions at The Queen's Hospital. Hawaii Med. J. **8:** 32.
4. STEINER, P. E. 1949. Etiologic implications of the racial incidences of gastric cancer. J. Natl. Cancer Inst. **10:** 429.
5. TAZAKI, Y. 1958. Clinical aspects of gastric carcinoma in Japan with answers to questionnaire. 3rd World Congr. Gastroenterol. Washington, D. C.
6. STRODE, J. E. 1951. Observations on cancer of the stomach in Hawaii; a study of 140 consecutive cases coming to surgery. Hawaii Med. J. **10:** 173.
7. RHEA, T. R. 1953. A comparative study of the mortality from gastric cancer in Hawaii. Hawaii Med. J. **13:** 107.
8. QUISENBERRY, W. B., I. L. TILDEN & J. L. ROSENGARD. 1954. Racial incidence of cancer in Hawaii; a study of 3,257 cases of malignant neoplastic disease. Hawaii Med. J. **13:** 449–451.
9. BOYD, W. 1950. A Textbook of Pathology. 5th ed. : 561. Lea & Febiger. Philadelphia, Pa.
10. MARNIE, J. G. 1953. Primary carcinoma of the liver: a statistical review of twelve cases seen at The Queen's Hospital 1947 to 1952. Hawaii Med. J. **13:** 113.
11. TILDEN, I. L. 1938. Carcinoma of the breast in Hawaii. Trans. Hawaii Territorial Med. Assoc.
12. PANG, L. Q. 1959. Carcinoma of the nasopharynx: an analysis of thirty-four cases and a preliminary report on palatal fenestration in its management. Ann. Otol. Rhinol. Laryng. **68:** 356.
13. ALLISON, S. D. & K. L. WONG. 1957. Skin cancer. A. M. A. Arch. Dermatol. **76:** 737–739.
14. SEGI, M. 1957. Observation on the mortality from ulcer of stomach and duodenum on the basis of the vital statistics data. (A part of the report presented to the International Society of Geographical Pathology by T. Kurokawa and A. Okabayashi.) Mimeographed report dated January 1957.

15. Ivy, A. C. 1955. Experimental observations on the etiology of gastric carcinoma. Gastroenterology. **28:** 325–359.
16. McLester, J. S. & W. J. Darby. 1952. Nutrition and Diet in Health and Disease. 6th ed. : 70–72. Saunders. Philadelphia, Pa.
17. Wynder, E. L. 1957. Non-occupational aspects of environmental cancer. CA—Bull. Cancer Progr. **7:** 14–20.
18. MacDonald, I. 1942. Mammary carcinoma: a review of 2,636 cases. Surg. Gynecol. Obstet. **74:** 75.
19. Graham, S., M. Levin & A. M. Lilienfeld. 1960. The socioeconomic distribution of cancer of various sites in Buffalo, N. Y. 1948–52. Cancer. **13:** 180–191.
20. U. S. Census of Population for Hawaii. 1950. Bull. P-C 52. Table 37.

SOCIAL FACTORS IN THE EPIDEMIOLOGY OF CANCER AT VARIOUS SITES

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A disease may be considered as a tissue change toward a morbid state that has been brought about by some biochemical or biophysical agent acting directly on the tissues. Usually this action is the last in a series of events that put the host in contact with the disease-producing agent.

Thus some as-yet-unidentified component of soot apparently is the last in the series of events which can cause scrotal cancer. Equally interesting epidemiologically, however, and equally useful from the point of view of prevention, is the fact that exposure of the scrotum to soot, as noted in classical epidemiological literature, was characteristic of chimney sweeps in 18th century England.[1] Thus the train of events producing some scrotal cancer in Percival Pott's day was somewhat as follows: (1) the presence of a sociocultural need for home-space heaters producing much smoke and soot; (2) the fact that exhaust passages required cleaning; and (3) the resultant development of the occupation of chimney sweep, which put the worker into close contact with soot. We probably have more reliable data about scrotal cancer causation in humans than about any other malignant neoplasm. It is interesting, however, that we have still to identify the carcinogen in soot; our most reliable knowledge regarding the etiology of scrotal cancer is epidemiological and involves social facts in large part.

Study of the epidemiology of this disease illustrates a number of characteristics of one process of disease causation (FIGURE 1). First there is an agent producing the tissue change; then there is the vehicle for this agent, for example, soot; some behavior pattern must then expose the host to this vehicle; and, finally, the behavior pattern may be peculiar only to certain segments of the population, for example, chimney sweeps. Of course a nonbehavioral environmental item may figure importantly in the chain, but few environmental exposures are unencumbered with social overtones. Thus while exposure to the sun is linked with skin cancer, it is obvious that social factors such as occupation and place of residence are also related to the disease.

From the point of view of prevention, the chain of events leading to disease may be interrupted at any stage, and the disease thereby controlled. It is not necessary, obviously, to recognize the agent that causes the tissue change itself in order to effect prevention. From the point of view of understanding disease etiology, on the other hand, it is apparent that the whole process of disease causation, all of the events leading to disease, must be studied. This involves epidemiological field work as well as laboratory investigation, and the gamut of phenomena from biosocial to biochemical and biophysical must be examined as they might relate to the disease. To achieve a coherent and complete theory of causation of a given disease, data of all three sorts must be obtained, and each kind found to be consistent with the others in relation to the disease. Until such is the case the understanding of the etiology of a given disease is incomplete.

The strategy of epidemiological investigation devolves from the etiological chain of events that we have described. In instances where there are hints as to the relation between a behavior pattern and a disease, for example, in the case of cigarette smoking and lung cancer, the investigation may begin with the suggested behavior trait. Hunches in such instances are derived from knowledge regarding the function of a given organ as related to behavior that conceivably might affect it.

Often, however, no such hypotheses suggest themselves, and here the strategy must be revised. It will be recalled that specific behavior traits are frequently peculiar to certain segments of the population. Thus contact with paraffin or soot was peculiar to mule spinners and chimney sweeps. Such a circumstance suggests that investigation of the presence of disease in occupational, or other categories of social groups within society, might be useful. If it were discovered that a given occupational group had more of a disease, as indeed was the case with scrotal cancer, further investigation could be carried out to discover the specific behavioral trait characterizing this group that might be responsible for producing the disease. The discovery of unusually large or small quantities of a disease in particular segments of the population is useful; this is true because such discoveries suggest that further investigation of the group might uncover the factor that is predisposing to, or protecting against, this disease.

SOCIAL GROUP
(chimney sweeps)
↓
BEHAVIOR PATTERN
(working in chimneys)
↓
VEHICLE
(soot)
↓
AGENT
(?)
↓
TISSUE CHANGE
(cancer of scrotum)

FIGURE 1. Etiological chain of events producing some disease.

Such groups are particularly useful where they are homogeneous. It is much easier to pinpoint the potential carcinogen in an occupational group as distinctive as chimney sweeps than it is in groups as heterogeneous, say, as socioeconomic or rural-urban groups. While socioeconomic distributions are useful, investigation of such fairly heterogeneous categories must be supplemented by other variables; ethnic background, religion, occupation, industry, region, marital status, age, and other characteristics could be investigated profitably. Nevertheless these gross demographic characteristics are not hard-core variables. They can be useful only to suggest possible future avenues of research. Thus the finding that Japanese-Americans have more gastric cancer than others suggests that an investigation of their diets, as compared to diets of others, might be useful.

Several examples of these various points suggest themselves. As it is my purpose to provide a survey of studies in which social factors appear to figure in cancer etiology, I shall attempt no extensive description of study methods in these researches; instead I shall briefly describe methods and selected findings. One of the most graphic is the situation regarding knowledge of lung cancer etiology. Ever since 1604, when a member of the court of English King James I wrote against the use of tobacco on the grounds of health, the weed has been designated as harmful by one writer or another. Much more recently, investigators have noted a great increase in lung-cancer incidence, and the use of cigarettes, obviously a bronchial irritant, was suspected as a cause. A large number of retrospective studies accomplished on hospital populations remarked an excess incidence of lung cancer among smokers as compared to nonsmokers.[2]

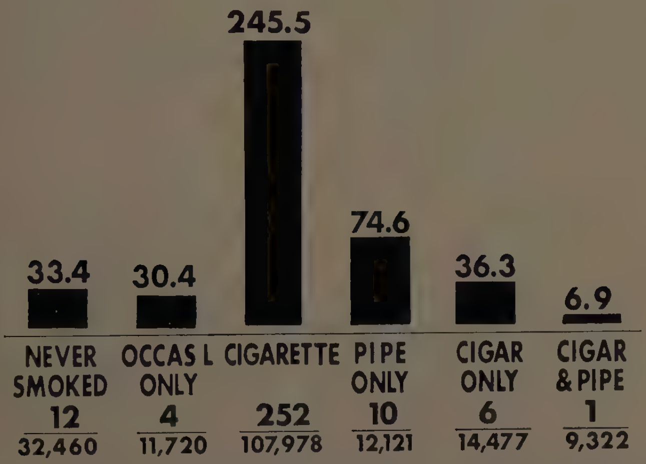

FIGURE 2. Carcinoma of lung deaths (all reported). From E. C. Hammond and D. Horn, "A Study of the Relationship between Smoking and Death Rates: Preliminary report of the 1954 follow-up." Paper presented at the annual meeting of the American Medical Association in Atlantic City, N. J., June 6, 1955.

Recently three prospective studies of large population groups have been carried out with the same results.[3-5] FIGURE 2 indicates one finding in the study of Hammond and Horn.[4] Briefly their procedure was to interview approximately 200,000 males regarding their smoking habits, wait an interval of several years, interview them again as to changes in smoking behavior, and measure the mortality from various diseases among smokers and nonsmokers. As is evident in FIGURE 2, cigarette smokers had much higher rates of mortality from lung cancer than others, 245 per 100,000, as compared to 33 for nonsmokers. Investigation of deaths among persons who smoked various numbers of cigarettes revealed an increased rate with each increase in the number smoked. Persons who had stopped smoking during the years investigated had lower rates than those who continued.

Critics might argue that possible self-selection of smokers is responsible for the finding, that an x factor is really responsible both for the lung cancer and the smoking and thereby creates the association between the two. One way to solve this might be to allocate cigarette-smoking randomly to a large group of males, control their environment, wait 20 to 30 years for the slow-acting carcinogen to take effect, and then measure the lung-cancer rate. It is unlikely that such an experiment could take place. The point we are making, however, is that the epidemiological evidence based on behavior must be supplemented by laboratory studies.

A number of kinds of laboratory studies have been completed that contribute findings consistent with and supplementary to the epidemiological discoveries. A number have found substances in tobacco smoke that are carcinogenic to animals. One of the more interesting studies is that by Auerbach *et al.*[6]

Auerbach and his colleagues dissected the tracheobronchial tree out of the lungs of 402 white males who had died of various causes. They then prepared 208 sections for histological study for each male, and systematically selected 55 from each for examination. The slides were examined to discover the presence of cell changes in men who had been nonsmokers or smokers of various amounts of cigarettes. Auerbach *et al.*[6] found that while much of the bronchial epithelium of nonsmokers was normal, only 0.2 and 0.1 per cent, respectively, of the sections of heavy smokers and lung-cancer cases showed normal epithelia. As FIGURE 3 shows, no sections of the epithelia of nonsmokers revealed carcinoma *in situ*, while 11.4 per cent of those of heavy smokers did. In terms of individual autopsies, they found that 75 per cent of heavy smokers had at least one slide showing carcinoma *in situ*, as compared to none for persons who did not smoke or smoked only occasionally. Such evidence, it is obvious, goes far toward supplying the laboratory verification of the cigarette-lung-cancer relationship that is needed.

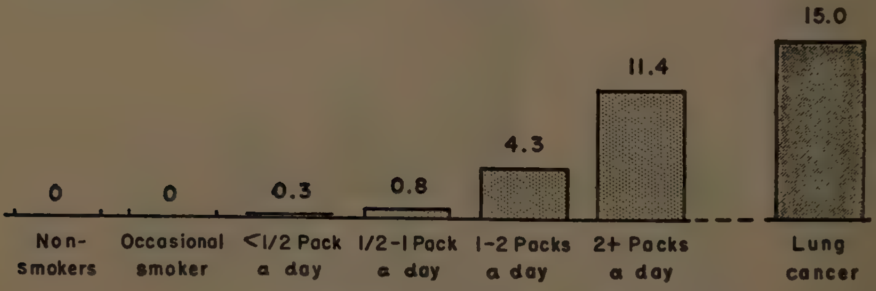

FIGURE 3. Percentage of slides with carcinoma *in situ*.[6]

Another long-standing relationship between a behavioral characteristic, or congeries of them, and cancer at a particular site, is observed in the case of cancer of the cervix. For several years it has been shown that the incidence of cervix cancer among Jews is much less than that in non-Jews. TABLE 1, from a report by Wynder *et al.*[7] shows that in a number of series of patients, the incidence of cancer of the cervix among non-Jews is from 5 to 17 times higher than that in Jews. Such a finding stimulates considerable speculation as to possible reasons for the association. It is possible that there is a recessive gene pool among Jews that protects them against the disease. It is equally possible that some cultural pattern characteristic of this religious group is providing the protection. Circumcision has been suggested as such a characteristic. Thus the demographic finding of low incidence in a religious group has stimulated investigations that will increase understanding of the etiology of the disease. These studies have been based on queries to women with and without cancer of the cervix as to the circumcision status of their husbands. To date, investigation has shown the expected relationship in one case and no relationship in the other.

TABLE 1*

RELATIVE INCIDENCE OF CARCINOMA OF THE CERVIX IN JEWS AND NON-JEWS AT THREE AMERICAN HOSPITALS[7]

Hospital	Years	Total cases of cervix cancer	Incidence of cancer of the cervix in non-Jews relative to that in Jews
Mt. Sinai, New York, N. Y.	1893–1906	18	17.0:1
	1909–1918	85	12.5:1
	1928–1948	323	5.3:1
Bellevue, New York, N. Y.	1925–1945	1317	5.9:1
Memorial Center, New York, N. Y.	1916–1937	3106	8.5:1

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TABLE 2

COMPARISON OF PATIENTS' STATEMENTS WITH EXAMINATION FINDINGS CONCERNING CIRCUMCISION STATUS

Examination finding	Patients' statements				Total
	Circumcised		Not circumcised		
	Number	Per cent	Number	Per cent	
Circumcised	37	19.3	47	24.5	84
Not circumcised	19	9.9	89	46.3	108
Total	56	29.2	136	70.8	192

Some of this confusion is no doubt due in part to the difficulty encountered in studying such variables. The sociologist or anthropologist is well aware of such difficulties, and he finds himself on familiar ground in the study of epidemiology. At Roswell Park Memorial Institute my colleagues and I initiated a small study to examine the possibility of confusion in defining circumcision.[8] On admission to the institute, all males are interviewed routinely and asked whether they are circumcised. To carry out the study we enlisted the aid of examining physicians, who reported whether the patient was circumcised without knowing anything about the patient's own opinion. As TABLE 2 shows, 9.9 per cent of the patients said they were circumcised when the physician said they were not, and 24.5 per cent said they were not circumcised when the physician was of the opposite opinion. Thus 35 per cent of them apparently made erroneous statements about their circumcision status. Because of the large amount of error encountered in obtaining data from individuals on this personal but very concrete question, previous studies of circumcision status are open to question. As a result studies in progress will attempt to relate examination findings regarding circumcision to cancer of the cervix.

Other research has uncovered relationships between social characteristics and breast cancer. Recently M. L. Levin, A. M. Lilienfeld, and I examined these relationships in a series of 468 breast-cancer patients at Roswell Park Memorial Institute admitted between April 17, 1955, and April 17, 1957. These were compared with 819 female patients admitted during the same period and found to have noncancer diseases involving sites other than the reproductive organs. The full report is not yet published, but I shall describe one finding that has pertinence here. TABLE 3 shows age-adjusted percentages of women in the mammary cancer and control groups who nursed various numbers of children. It is noteworthy that the percentage of women among the breast-cancer cases who nursed 0, 1, or 2 children did not differ from that of the controls in any substantial way. It is interesting, however, that the proportion nursing 3 or more children was 20.9 per cent among the breast-cancer patients as compared to 30.1 per cent among the controls. Thus considerably fewer of the breast-cancer cases nursed several children than was true of the controls. This is consistent with Lane-Claypon's earlier finding that fewer children of breast-cancer patients were nursed than were those of controls.[10]

TABLE 3

NUMBER AND AGE-ADJUSTED PERCENTAGE OF EVER-MARRIED PATIENTS WITH AT LEAST ONE PREGNANCY NURSING VARIOUS NUMBERS OF LIVE BIRTHS

	Total No. cases	Nursed zero		Nursed one		Nursed two		Nursed three or more	
		No. cases	Standardized (%)	No. cases	Standardized (%)	No. cases	Standardized (%)	No. cases	Standardized (%)
Cancer of breast	314	82	27.4	86	27.3	77	24.4	69	20.9
Noncancer other than reproductive sites	597	144	23.6	161	27.0	114	19.3	178	30.1

Our other investigations on this series indicated that breast-cancer patients marry later and have their children later than controls. Both of these are characteristics of persons in the upper socioeconomic classes. It is interesting, therefore, that our investigation shows that total incidence of breast cancer is found more in the upper than in the lower socioeconomic classes.

TABLE 4 reveals that the incidence of breast cancer in the highest socioeconomic quartile was 77.7 per 100,000 and decreased progressively in each lower quartile to 53.8 in the lowest.[9]

A final instance in which social factors have appeared to play some part in developing our knowledge of etiology is derived from studies of ethnic background. Quisenberry *et al.*[11] have noted several important relationships characterizing Asiatic groups, as well as Caucasoid ones. Our own experience, again involving Levin, Lilienfeld, and myself, is based on the study of a series comprising all of the 35,701 patients admitted to Roswell Park Memorial Institute between 1945 and 1957. A full report will be published later, but we shall describe one of the findings here. TABLE 5 shows the age-adjusted percentage of persons with cancer of the esophagus and cancer of the large intestine who were Polish or Italian born as compared to controls who were patients with diseases not involving neoplasms. The column headed "Italy-Sicily" indicates that while 21.4 per cent of the controls derived from Italy or Sicily, almost twice as many patients with cancer of the large intestine were born in that country. Cancer of the large intestine, of course, is found more often in cities than in rural areas, and it might be suggested that Italians were found more in this diagnostic group because in America they are urbanites. An examination that adjusted for urban-rural, as well as age differences of cases and controls, again revealed the relationship, which could occur by chance less than 5 times in 10,000.

TABLE 4

AVERAGE ANNUAL AGE-STANDARDIZED INCIDENCE RATES OF REPORTED FEMALE PATIENTS WITH CANCER OF THE BREAST, BY SOCIOECONOMIC QUARTILE, BUFFALO, N. Y., 1948 TO 1952*

Site of cancer	Socioeconomic quartile							
	1 (highest)		[illegible]		3		4 (lowest)	
	No. of patients	Rate per 100,000	No. of patients	Rate per 100,000	No. of patients	Rate per 100,000	No. of patients	Rate per 100,000
Breast	350	77.7	229	62.3	210	66.4	142	53.8

* White population only.

TABLE 5

NUMBER AND AGE-ADJUSTED PERCENTAGES OF FOREIGN-BORN WHITE MALE PATIENTS HAVING CANCER OF THE LARGE INTESTINE AND ESOPHAGUS WHO WERE BORN IN ITALY OR POLAND, AS COMPARED WITH CONTROLS
Roswell Park Memorial Institute, Buffalo, N. Y., 1945 to 1957

Diagnosis and control groups	Total foreign born	Birth place			
		Italy-Sicily		Poland-U.S.S.R.	
		No.	Adjusted (%)	No.	Adjusted (%)
Cancer, large intestine	62	24	39.6*	15	21.7
Cancer, esophagus	102	14	12.4	41	42.5†
Controls (nonneoplasms)	990	212	21.4	234	22.6

* Probability of such a difference between cancer and controls in per cent Italian and other foreign born < 0.005. Test adjusts for urban-rural and age differences.

† Probability of such a difference between cancer and controls in per cent Polish and other foreign born < 0.005. Test adjusts for urban-rural, age, and cigarette-smoking differences.

The column headed "Poland-U.S.S.R." shows that while 42.5 per cent of patients with cancer of the esophagus derived from those countries, this was true of only about one half as many controls. This relationship still held when adjustment was made for two other traits characteristic of patients with cancer of the esophagus: cigarette smoking and urban-rural residence. The probability figure was again less than 5 in 10,000.

We must say of these findings what we need to say about all of the foregoing, with the possible exception of those relative to lung cancer, that much replication is needed to establish whether the social relationships discovered are genuine or spurious. Beyond this, however, we must examine the social characteristics of each of the groups in which there appears a cogent relationship to determine what factors might predispose to or protect against the disease in question. It is not in itself important to know that Jews have low incidence of cervix cancer or Poles a high degree of esophageal cancer. Such information is important only as a stimulus to future work. Knowledge about the behavioral traits of these groups as they might be related to the disease in question must be employed to generate hypotheses explaining high or low incidence. If we know that certain foods are characteristic of Polish diet, it is logical to investigate the potential of these foods for changing the form of esophageal cells. This would involve social research on whether eating certain foods is related to esophageal cancer as well as biochemical research to understand the manner in which the food substances affect cell function.

This is apropos of my earlier point to the effect that biosocial investigation must be supplemented by biochemical or biophysical research. The reverse is also true. It has been found in studies of mice, for example, that crowding of the animals produces less mammary cancer.[12] Such a hypothesis becomes much more useful if a similar discovery is made for humans. It is apparent that epidemiology is a multidisciplinary science. The widest possible knowledge regarding etiology can be discovered only through utilizing the approaches and findings of each science to stimulate new discoveries and to corroborate earlier ones.

References

1. Whitmore, W. F. 1959. Tumors of the male generative tract. *In* Cancer Diagnosis and Treatment. : 411–413. J. B. Field, Ed. Little, Brown. Boston, Mass.
2. Study Group On Smoking and Health. 1957. Smoking and health: Joint report of the study group on smoking and health. Science. **125:** 1129.
3. Doll, R. & A. B. Hill. 1956. Lung cancer and other causes of death in relation to smoking: Second report on mortality of British doctors. Brit. Med. J. **2:** 1071.
4. Hammond, E. C. & D. Horn. 1958. Smoking and death rates—Report on 44 months of followup, 187,783 men. J. Am. Med. Assoc. **166:** 1159–1294.
5. Dorn, H. F. 1958. Smoking and Cancer. Social Statistics Section Proceedings of the American Statistical Association. : 34–71.
6. Auerbach, O., A. P. Stout, D. C. Hammond & L. Garfinkel. 1959. Changes in bronchial epithelium in relation to cigarette smoking and in relation to lung cancer. Paper presented at the clinical meeting of the American Medical Association. Dallas, Texas; Dec. 4, 1959.
7. Wynder, E. L., J. Cornfield, P. D. Schroff & K. R. Doraiswami. 1954. A study of environmental factors in carcinoma of the cervix. Am. J. Obstet. Gynecol. **68:** 1016.
8. Lilienfeld, A. M. & S. Graham. 1958. Validity of determining circumcision status by questionnaire as related to epidemiological studies of cancer of the cervix. J. Natl. Cancer Inst. **21:** 713.

9. Graham, S., M. Levin & A. M. Lilienfeld. 1960. The socioeconomic distribution of cancer of various sites in Buffalo, N. Y., 1948–1952. Cancer. **13:** 18.

10. Lane-Claypon, J. E. 1926. A further report on cancer of the breast with a special reference to its associated antecedent conditions. Reports on Public Health and Medical Subjects. No. 32. The Administry of Health. London, England.

11. Quisenberry, W. B., I. L. Tilden & J. L. Rosengard. 1954. Racial incidence of cancer in Hawaii: A study of 3,257 cases of malignant neoplastic disease. Hawaii Med. J. **13:** 449.

12. Andervont, H. B. 1944. Influence of environment on mammary cancer in mice. J. Natl. Cancer Inst. **4:** 579.

PROBLEMS IN THE STUDY OF CORONARY ATHEROSCLEROSIS IN POPULATION GROUPS*

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The lesions to be discussed have been defined by two World Health Organization (W.H.O.) Study Groups, Geneva, Switzerland, as follows: "Atherosclerosis is a variable combination of changes of the intima of arteries consisting of focal accumulations of lipids, complex carbohydrates, blood and blood products, fibrous tissue and calcium deposits, and associated with medial changes."[1] "Ischemic heart disease has been defined as the cardiac disability, acute and chronic, arising from reduction or arrest of the blood supply to the myocardium in association with disease processes in the coronary arterial system."[2]

More specifically this presentation will deal with the involvement of the coronary arteries by the atherosclerotic lesion. Therefore the two definitions have been joined to form the term "coronary atherosclerotic heart disease."

The walls of the major coronary arteries have a specific morphology, metabolism, enzyme system, and environment, and they are subjected to special kinds of hemodynamic stresses.[3] These facts must be kept constantly in the foreground because, unfortunately, some of the investigations into the pathogenesis of coronary atherosclerotic heart disease have given the impression that the disease process, to quote the late Lyman Duff, is "so independent of the substrate of the vessel wall that it may occur in the absence of blood vessels themselves."[3] Any information derived from the study of sociocultural factors that are believed to be associated with the development of coronary athersclerotic heart disease must ultimately fit within an acceptable hypothesis that will explain the development of the lesion as defined within the confines of the biological system of the human coronary arteries.

Currently there are three widely discussed hypotheses that have been suggested for the pathogenesis of coronary atherosclerosis. The first is that a dietary factor or factors and/or stress (emotional or physical), and/or high blood pressure, alone or in combination, may be associated with the development of lipidemia. This lipidemia is then believed to favor the excessive accumulation of a lipid complex in the coronary arterial wall. It is from this lipid complex that the basic lesion is thought to develop.[4] A second hypothesis states that disturbances of a primary nature in the blood coagulation mechanisms in association with vascular injury results in the deposition of a fibrin coagulum on the intimal surface of the arterial wall. These

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* This report is based on past and continuing studies at Beth-El Hospital, Brooklyn, N. Y.; the Department of Laboratories and Research of Westchester County, N. Y.; and the Department of Pathology, College of Physicians & Surgeons, Columbia University, New York, N. Y. Some of the autopsy studies have been made in collaboration with V. A. Bradess, Valhalla, N. Y., and some of the population studies were done in collaboration with D. Nathan, Rockville Center, N. Y.

The research involved was supported in part by Grant R-745 from the Westchester Heart Association, Purchase, N. Y. and by Grant R-776 from the National Heart Institute, Public Health Service, Bethesda, Md. These studies have been aided by the cooperation of the membership of the Associated Health Foundation, New York, N. Y.

fibrin thrombi may then progress into the typical atherosclerotic lesion, particularly in the presence of lipidemia.[5] A third hypothesis suggests that chemical and/or physical alterations occur in the ground substance of the vessel wall, which in turn favor the development of the atherosclerotic lesion.[6] Of the three, the first has the most convincing morphological, experimental, epidemiological, and clinical support.[7-9] The final acceptance of any of these will require validation at the molecular level and evidence of prevention or alleviation of the disease at the human level. However, even in this current period when hardly any self-respecting pathologist ventures into the investigative world without an electron microscope or two, a histocytochemical laboratory, and some radioisotope equipment neatly tucked away in his intellectual knapsack, considerable advance toward a practical solution of the problem of coronary atherosclerotic heart disease can still be accomplished by studying such grosser elements as the total man and his way of life. By looking into the manner in which men eat, travel, work, and play in the various societies and cultures, considerable insight has been gained toward a solution of this pressing health problem. The information thus obtained will obviously require confirmation and refinement on the experimental and molecular level.

Widespread population studies have indicated that, among many other peoples, the rural Guatemalan, the Yemenite Jew, the South African Bantu, the Eskimo, the Chinese, and the Japanese people in their native environments up to the present time have suffered much less from coronary atherosclerotic heart disease than, for example, the white male in such areas as New York, N. Y., New Orleans, La., England, Sweden, and parts of Finland.[10-14] The problem, therefore, is to find those biologically valid common denominators that in this respect link these diverse and scattered peoples, some of whom have only recently emerged from tribal or nomadic life, with those in rural regions and areas of modern industrialization. The definitive answer to this should undoubtedly prove to be the important basis for a practical program to prevent or alleviate coronary atherosclerotic heart disease, which in certain areas has reached epidemic proportions.

Increase in Coronary Atherosclerosis

The problems involved in the epidemiological study of coronary atherosclerosis are both complex and multitudinous, chiefly because it appears certain that multiple causation is involved and because of the many years it takes for the lesion to become advanced, during which time there are as yet inadequate clinical or laboratory measuring devices available. The magnitude as well as the complexity of this problem is also indicated by the fact that not only are there significant differences in the degree and prevalence of the disease in widely scattered areas, but in some communities over the past 30 years, as for instance in metropolitan New York, there appears to have been a quantitative increase in the degree of coronary atherosclerosis. Thus one must account not only for the differences among scattered populations but also for a significant increase in the same population group over a period of time.

It has been claimed that much of this increase in coronary atherosclerotic heart disease is more apparent than real, and is perhaps related to the fact that many individuals who, in the preantibiotic era, would have died from acute infectious diseases now survive, only to develop coronary atherosclerosis. Studies by my colleagues and myself support the contention that the recent increase in coronary atherosclerosis is absolute and considerable. This evidence is based on the comparative degree of coronary atherosclerosis in autopsied adult white males from 1931 to 1935 and from 1951 to 1955; on the change in the relative role of hypertension as a factor in the development of coronary arterial occlusion in white males under the age of 55 over the past 30 years; and upon changes in the age ratio of sudden deaths from coronary atherosclerotic heart disease in 1949 as compared to 1959.

In the first of these studies determination was made of the degree of coronary atherosclerosis in consecutive post-mortems from 1931 to 1935 on otherwise previously healthy individuals who had died within three weeks from the onset of such acute infections as pneumococcus pneumonia and streptococcal cellulitis. Cases were excluded from the study only if other disease states were present that are believed to influence the rate of atherogenesis. The degree of coronary atherosclerosis was ascertained by the evaluation of the gross and microscopic descriptions pertaining to diffuseness, character of the lesion, and the extent of luminal narrowing. The autopsy protocols of the Presbyterian Hospital in the City of New York, where this study was made, fortunately contained detailed accounts of the condition of the coronary arteries. These autopsies had been performed throughout the period under study with the same standardized techniques under the supervision of the same prosectors. The degree of coronary atherosclerosis was classified as minimal, moderate, or advanced. The period from 1931 to 1935 was selected because it was the last available time in which antibiotics and other effective antibacterial agents were not generally in use for the treatment of acute infections. Therefore the coronary arteries of sufficient numbers of young adult males, otherwise free of chronic disease, were available for study. The autopsies studied from 1951 to 1955 were also consecutive, and had been performed on otherwise healthy adult white males who had been killed instantaneously in automobile or industrial accidents in Westchester County, N. Y. Selection of the cases was based on age and matched with the cases from Presbyterian Hospital that had been studied in the previous period. A survey of the ethnic origins and occupational classifications, to the extent that this was possible, on autopsied individuals revealed no significant differences in either group. Strict comparability could not be obtained because of the difficulty in retrospectively collecting sufficient numbers of available autopsies with reliable data. To this extent one must temper direct comparison on the data. In all age categories the males from 1951 to 1955 showed a considerably greater degree of coronary atherosclerosis than those from 1931 to 1935. It is noteworthy that in the earlier period only one of 50 autopsied males had more than minimal coronary athersclerosis, whereas in the recent period more than minimal degrees of coronary atherosclerosis were present in 26 of 50 males under the age of 45 (TABLE 1).

An autopsy study in Sweden,[15] in which the degree of coronary atherosclerosis in males in 1934 was compared with that in 1958, also revealed an increase in the severity of coronary atherosclerosis.

Analysis of the relative role of systemic hypertensive disease in the development of coronary atherosclerotic heart disease in males under the age of 55 consisted of a comparison of 25 consecutive autopsied cases in each period on individuals who had died from coronary "occlusion." The age limit of 55 was selected because it has been found that over this age "too many streams meet and the waters become muddy." For the purposes of this study, only those cases were considered to have hypertensive disease in whom the diastolic pressures had been over 110 and in whom the heart at post-mortem examination weighed at least 500 gm. The average ages of the cases in both periods was 47 and 46.5 respectively (TABLE 2). From 1931 to 1935 the ratio of the cases with hypertensive disease associated with coronary occlusion to those cases of coronary occlusion unassociated with hypertension was 5:1. In the recent period this ratio became reversed and was 1:2.5. Since there is no reason for assuming that the incidence of hypertensive disease has significantly decreased over this period, we are perhaps justified in concluding that these findings indicate a considerable increase in coronary atherosclerotic heart disease with occlusion that is entirely independent of hypertension as a factor in its pathogenesis.

TABLE 1

THE DEGREE OF CORONARY ATHEROSCLEROSIS IN ADULT WHITE MALES COMPARED FROM 1931 TO 1935 AND FROM 1951 TO 1955

Degree of coronary atherosclerosis	Age													
	26–30		31–35		36–40		41–45		46–50		51–55		56–60	
	A	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
Minimal	9	6	14	7	18	7	9	3	13	4	10	2	7	1
Moderate	0	3	0	7	0	11	1	6	5	12	4	10	5	8
Advanced	0	0	0	0	0	0	0	1	2	4	2	4	2	5

A = Period from 1931 to 1935; male fatalities from acute infection.
B = Period from 1951 to 1955; male fatalities from accident.

TABLE 2

HYPERTENSION AND CORONARY OCCLUSION IN MALES UNDER 55 COMPARED FROM 1931 TO 1935 AND FROM 1955 TO 1958, BASED ON 25 CONSECUTIVE AUTOPSIES IN EACH PERIOD

Period	Average age	Hypertension with coronary occlusion	Coronary occlusion alone	Total
1931–1935	47	21	4	25
1955–1958	46.5	7	18	25

Finally an autopsy study of all the unexpected and sudden deaths from coronary atherosclerotic heart disease in Westchester County, N. Y. that had been reported to the Medical Examiner's Office revealed that in 1949, 1 out of every 7 cases was under the age of 45, while in 1959 this had increased to 1 out of every 4 cases under the age of 45.

Analyses of vital statistics, such as hospital admission rates, also indicate that there has been a considerable increase in this disease manifested not only by a higher morbidity and mortality rate but also by the moving of the base toward the younger age groups.[16]

The proportions of this change in the New York metropolitan area over the past 30 years can almost be compared to the size of the difference that exists between the degree of coronary atherosclerotic heart disease in the South African Bantu males and the white males in the New York metropolitan area in the previous 30 years (FIGURE 1). The clinical significance of these differences is not the same because, up to a certain point, the addition of more atherosclerosis in the coronary artery does not necessarily reflect in any increase in morbidity or mortality. However, any small increment beyond a certain point may disproportionately increase the morbidity and mortality rates well beyond the quantitative amounts of this increment of atherosclerosis. An attempt has been made to illustrate this difference by the construction of schematic diagrams that roughly indicate the degree of atherosclerosis present in the 30- to 50-year-old males in South Africa and white males in the New York area of the two periods under discussion (FIGURE 1). These diagrams are based on our post-mortem studies as well as on those available in the literature.[17] Obviously these diagrams are not to be considered as quantitatively exact representations of the degree of coronary

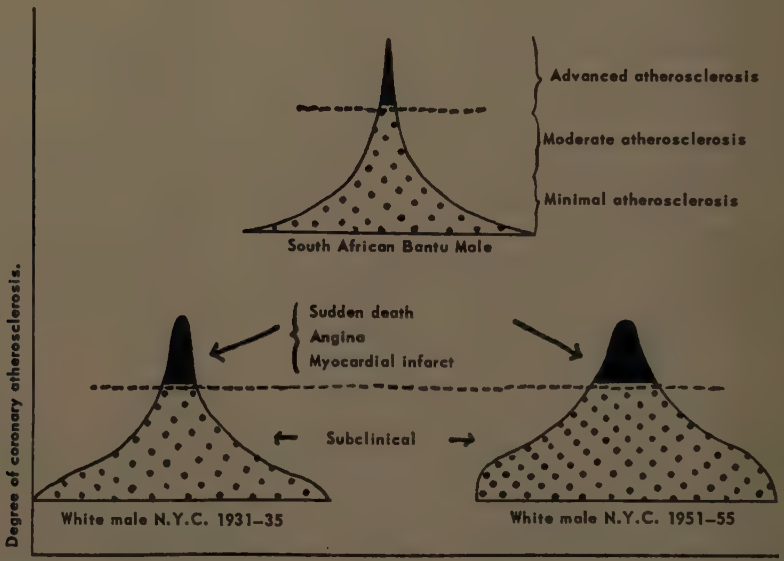

FIGURE 1. Schematic representation of degree of coronary atherosclerosis in male population from 30 to 50 years of age, in areas designated. Also indication of the relative amount of those with clinical evidence of coronary atherosclerotic heart disease.

atherosclerosis prevalent in the populations indicated; they serve merely in a general way to illustrate certain aspects of this problem.

Are the changes that have taken place over the past 30 years in the New York area comparable to the differences that exist between the environment of the South African Bantu and the New York City male? A superficial analysis reveals that over the past 30 years there has been manifold increase in automotive transport, undreamed-of advances in mechanization and automation in industry, average diets with a higher percentage of animal fats, a relatively prosperous society as compared to a depression period, and emergence from a prewar period through World War II into the atomic and nuclear cold-war era. The insurance companies have been forced to revise their average-weight tables about 10 lb. upward. With the advent of television, a new industry has developed that prepackages frozen dinners, including ice cream, whipped cream desserts, and other delicacies designed to tempt the viewer. While the viewer is in this oblivious state he munches continuously and contentedly. His only exercise night after night is to take 5 or 10 vigorous steps from his chair near the television set to the door of the refrigerator. In short we are tending to become a nation of television athletes.

Garn[18] in his report to the recent White House Conference on Children and Youth stated: "If 35 per cent of his calories comes from fats, is Junior being prepared, starting in nursery school, for a coronary occlusion? . . . Reviewing the dietaries of some of our teenagers, I am struck by the resemblance to the diet that Olaf Mickelsen uses to create obesity in rats. Frappés, fat-meat hamburgers, bacon and mayonnaise sandwiches, followed by ice cream may be good for the farmer, good for the undertaker, and bad for the populace. . . . Through the stimulation of advertising, tap water is being replaced by sugared juices, milk, and carbonated drinks. Snacks have become a ritualized part of the movies and are inseparably associated with television viewing."

Likewise our current studies on several thousand Jewish males from one fraternal organization in the metropolitan area indicate, upon careful interviewing, that several hundred would qualify as television athletes. This indeed can be considered a major change in the living habits of many people. Nevertheless we face the paradox of measuring progress in the less developed areas of the earth by how many glasses of milk a child can obtain.

Submerged Coronary Atherosclerosis

One of the major difficulties is the fact that we are not dealing with an all-or-none phenomenon. For instance in studying the epidemiology of typhoid fever, the individuals had or did not have the disease, so that a clear distinction could be made between the infected and noninfected individuals who served as controls. No such definitive distinction can be made in relation to coronary atherosclerosis. This problem is also illustrated in FIGURE 1 and may be referred to as the "iceberg" phenomenon. In other words there is no clear delineation in any specific group of individuals between those who have clinical evidence of the disease and those who have not. The amount of coronary atherosclerosis in any population group is a continuous variable, with the most advanced degrees of atherosclerosis representing the 5 to 10 per cent who show clinical evidence of the disease. It is impossible to make a clear separation of the sheep from the goats although this is necessary when we are trying to uncover those characteristics of a population most frequently associated with variations in the frequency of the disease. The "normal" control in many instances may have quantitatively only a slightly smaller degree of atherosclerosis than the one with clinical manifestations of the disease.

This same difficulty is encountered when one attempts to correlate the distribution of serum cholesterol levels with clinical evidence of disease (FIGURE 2). This illustrates the relationship of serum cholesterol levels to the incidence of coronary artery disease in the Jewish males currently under investigation by us in the New York metropolitan area. Although the incidence of coronary atherosclerosis increases with the higher serum cholesterol levels and although the mean serum cholesterol level for a specific population group is a rough indicator of the incidence of coronary arteriosclerosis, these factors cannot be used as definite indicators of disease in specific individuals. Evidence available at present indicates that individuals living in environments where the population as a whole has low serum cholesterol levels will experience elevations in serum cholesterol upon appropriate change of environment and dietary habits. Recent experience with the Yemenite Jews illustrates this point.[19,20] Findings of this nature tend to subordinate the

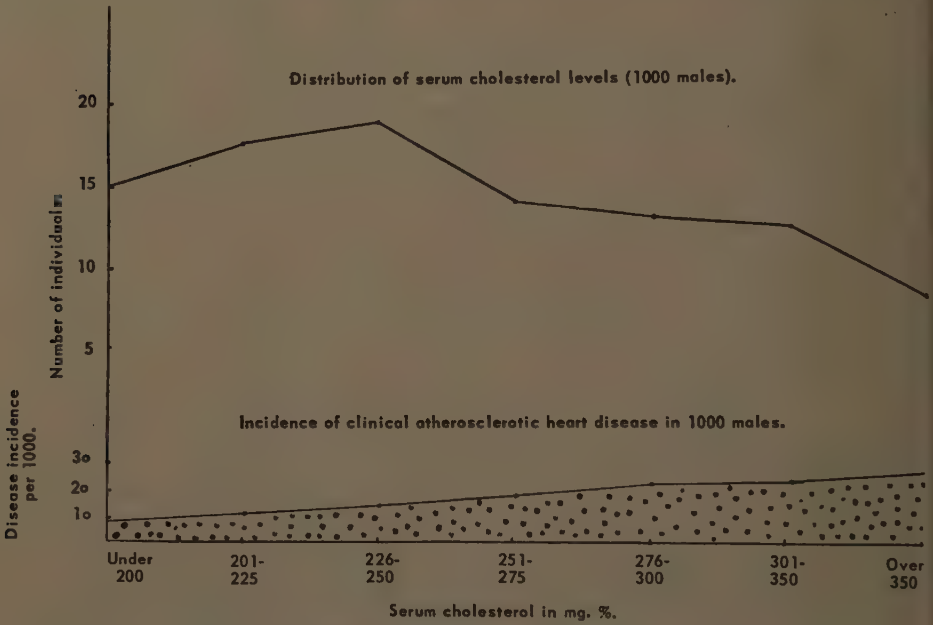

FIGURE 2. Representation of relationship of clinical coronary atherosclerotic heart disease rate to serum cholesterol levels in 1000 Jewish males in the New York metropolitan area.

importance of inborn racial or ethnic factors relative to metabolic control of cholesterol levels to factors subjected to environmental modifications.

Methodology and Biometrics

Specifically related to the question of separating the sheep from the goats is the problem, continually plaguing those engaged in population studies, that concerns itself with the ability to compare or equate data that is obtained in the various studies. To quote the World Health Organization Study Group on Atherosclerosis and Ischemic Heart Disease: "The diagnosis of ischemic heart disease in either the living or the dead often raises the question of methods which stand in the way of making valid comparisons among population groups. Unless methods are carefully standardized, only limited reliance can be placed upon reports of differences in morbidity and mortality attributed to disease in different localities."[2] This involves definitions, measurement standards, clinical diagnostic and laboratory techniques, as well as their reliability, uniformity, reproducibility, significance, and specificity. It concerns such areas as blood pressure measurements, electrocardiographic criteria, blood lipid determinations, anthropometric techniques, and interviewing and psychological testing devices.

In autopsy studies, where it is possible to measure directly the degree of coronary atherosclerosis, the investigator is confronted with difficulties in generalizing from his findings to the population at large. Both Mainland[22] and Berkson[21] have adequately described the selection and bias factors that are often present in hospital autopsy series. To a certain extent autopsy data derived from consecutive medical examiner cases may be somewhat more representative for studies on coronary atherosclerosis than those derived from hospital autopsy series.

There are also situations where conclusions, unfortunately, are based upon deductions derived from noncomparable data. For instance in one study on the South African Bantu male the conclusion was reached that atherosclerosis and its complications are prevalent to a high degree even in the younger individuals of this group. However, examination of the methodology in this study revealed that the findings and conclusions were based upon the degree of atherosclerosis in the aortic and cerebral vessels but not in the coronary arteries. These findings are not comparable to those in other studies because it has been repeatedly noted that there is no close correlation necessarily present between the severity of the atherosclerosis in the coronary arteries as compared to that present in the aorta and other vessels. Studies of our own as well as those of others have clearly demonstrated this (TABLE 3).[15,24,25]

It has also been shown that population groups that have considerable variation in the degree of coronary atherosclerosis do not necessarily manifest these differences to the same extent in the aorta.[26] The lack of parallelism between the degree of atherosclerosis in the aorta and coronary arteries is also pertinent to a proper understanding of the differences that exist between males and females relative to coronary atherosclerosis.[24]

General Disease Pattern of the Community

Proper evaluation of any data obtained in the area under discussion requires extensive knowledge of the general disease pattern prevalent in the particular community under investigation. It has been well established that certain diseases may enhance the atherogenic process while others may inhibit it.[27] Thus such conditions as diabetes mellitus, goiter, nephrosis, and familial hyperlipemia may enhance the atherosclerotic process. Such entities as cirrhosis of the liver, multiple myeloma, and nutritional disorders may retard the process. In liver disease, estrogen and lipoprotein lipase levels are high, and consequentially lower serum cholesterol levels are often present. Autopsy studies on individuals with cirrhosis of the liver indicate that lesser degrees of atherosclerosis are present. Thus in such communities as France, where cirrhosis of the liver is quite prevalent, and in some of the tropical areas where nutritional and parasitic diseases of the liver are frequent, the atherogenic process might very well be retarded. Failure to recognize this may distort the validity of other determinations.

TABLE 3

RELATIVE DEGREE OF ATHEROSCLEROSIS IN AORTA AND CORONARIES

(Between 30 and 50 Years of Age)

	Aorta > coronary	Aorta = coronary	Aorta < coronary
Female (46 cases)	21 (46%)	19 (41%)	6 (13%)
Male (77 cases)	6 (8%)	25 (32%)	46 (60%)

Heredity, Environment, and Body Type

Assuming the validity of the data gathered, its interpretation as to hereditary or environmental influences remains a formidable task. Facts in relation to the influence of genetic factors on the pathogenesis of coronary atherosclerosis have been derived from family and twin studies, analyses of body build, and lipid studies on ethnic and racial groups. With few exceptions most of the information can be interpreted in favor of genetic or environmental influences, depending entirely upon the particular bias of the investigator. Of particular interest are the investigations on the relationship of body build to the rate of development of coronary atherosclerotic heart disease. This is a subject with which I have been particularly concerned for many years.

Hippocrates recognized a body type that he referred to as the habitus apoplecticus, and he is said to have stated that "sudden death is more common in those who are naturally fat than in the lean."[15] According to our own studies as well as those of others, the chief cause of sudden death in males in this region is coronary atherosclerotic heart disease (TABLE 4).[28] More than 2000 years after Hippocrates, both Kretschmer[29] and Kolb[30] observed that atherosclerosis was more common in the pyknic type of individual. Gertler *et al.*,[32] using Sheldon's classification,[31] found that in young adults with myocardial infarction there was an overrepresentation of the endomorphic mesomorphs. Gertler *et al.*'s study suffered from the deficiency that the cases were selected, were nonconsecutive, and were obtained from various areas in which the over-all distribution of body types was not known. In our own studies reported in 1953,[33] the degree of atherosclerosis in the coronary arteries was determined at autopsy, and a rough modification of Sheldon's technique was used for classification of body types. In this study the degree of coronary atherosclerosis was most marked in the mesomorphs, less marked in the endomorphs, and least marked in the ectomorphs (TABLE 5). A closer correlation was also found between the level of serum lipids and the degree of coronary atherosclerosis in the mesomorphs.

TABLE 4

CAUSE OF DEATH ON CONSECUTIVELY AUTOPSIED ADULT WHITE MALES WHO DIED UNEXPECTEDLY AND SUDDENLY FROM NATURAL CAUSES WITHIN ONE HOUR OF THE ONSET OF THE ACUTE FATAL EPISODE*

Cause of death	Age									Total
	31–35	36–40	41–45	46–50	51–55	56–60	61–65	66–70	Over 70	
Coronary artery disease	6	54	64	69	72	67	41	26	23	422 (91%)
Other	0	5	3	6	9	6	4	2	6	41 (9%)
Total	6	59	67	75	81	73	45	28	29	463 (100%)

* Acute episodes were witnessed. These include all autopsied cases falling within the above-described category that were reported to the Medical Examiner's Office of Westchester County, N. Y., from March 9, 1949 to December 31, 1959.

TABLE 5

ATHEROSCLEROSIS OF CORONARY ARTERIES IN WHITE MALES: COMPARISON OF PHYSIQUE WITH DEGREE OF CORONARY ATHEROSCLEROSIS IN SUDDEN NONCARDIAC DEATHS

Body type	No. of cases	Average age	Degree of coronary sclerosis				
			0	1+	2+	3+	4+
Mesomorph	39	36	4	10	14	7	4
Ectomorph	31	35	17	8	5	1	0
Endomorph	13	35	4	7	2	0	0
Mixed	17	34	6	6	3	2	0
Total	100	36	31	31	24	10	4

More recently, an excellent post-mortem study has been reported from Sweden, in which a technique of determining body build that was developed by Lindegard was utilized.[15] Four factors were considered: length, sturdiness, muscle, and fat. These investigators concluded that the grade of coronary atherosclerosis tended to vary with the amount of muscle tissue but not with the skeletal dimensions, and that it also varied with a labile fat factor. These findings would appear to be in agreement with those of our own, since the mesomorphic individual probably has the greatest muscle factor.

In my own current investigations of Jewish males who were controlled for age, weight, blood pressure, smoking habits, and occupation, I noted that under the age of 45 years, 1.4 per cent of the ectomorphs had clinical evidence of coronary atherosclerotic heart disease, whereas the endomorph and mesomorph groups each had 8.2 per cent with coronary atherosclerotic heart disease (TABLE 6). This difference was accompanied by a higher rate of hypertension and a higher mean cholesterol level in the mesomorphs and endomorphs, but was unaccompanied by any differences in smoking habits or occupational physical activity among the various body types. The diets of all groups were excessively high in saturated animal fats. Obesity could not be considered as a factor in this difference since the over-all picture indicated that 15.1 per cent of the obese individuals had clinical evidence of the disease; those of average weight, 13.2 per cent. This small difference was readily accounted for by differences in the hypertension rate, which was twice as high in the obese individuals. However, when all age groups were considered the differences became much less marked. This fact also demonstrates another problem in the study of coronary atherosclerotic heart disease in that, over the age of 45, the influence of various factors tends to merge and the picture often becomes confused. Therefore clearer delineation of the relative influence of various factors can best be determined by studying the younger individuals.

TABLE 6

INCIDENCE OF CLINICAL CORONARY ATHEROSCLEROTIC HEART DISEASE IN JEWISH MALES BETWEEN THE AGES OF 31 TO 45 CLASSIFIED ACCORDING TO BODY TYPE

Somatotype	Total cases	No. with heart disease
Ectomorph	73	1 (1.4%)
Endomorph	185	15 (8.1%)
Mesomorph	169	14 (8.2%)
Median	228	10 (4.1%)

Several basic questions must be clarified before the significance of these findings can be best interpreted. Foremost among these is whether there are inherent developmental or acquired biochemical differences among the various somatotypes. Also to be determined is the question of the validity and specificity of the various methods of determining body build, as well as the stability over a period of time of any particular build in any single individual. Are there differences in the anatomic distribution of the coronary arteries that correlate with different body types, and then in turn with differences in the frequency of coronary atherosclerotic heart disease? Are there variations of a more subtle nature in that the pattern of behavior of the somatotypes differs in different cultures? Only carefully controlled crosscultural studies can answer these questions.

One group of investigators believes that an important reason for the differences existing between the South African Bantu male and other groups is that the Bantu has inherited a different coronary interarterial anastamotic blood supply that would tend to protect his myocardium.[34] On the other hand there is evidence to indicate that the pattern of clinical atherosclerotic heart disease differs in the Southern Negro as compared to the Northern Negro. In the North the pattern of the disease tends to approximate that of the white.[35] It would be extremely informative to know whether the South African Bantu mesomorphic male revealed more coronary atherosclerosis than the South African Bantu ectomorphic male.

Occupational Physical Activity

Aside from the marked increase in the consumption of saturated animal fats,. there is probably no more profound alteration in recent times in this country than in the nature of our occupational physical activity. Mechanization, automation, and transport have turned most jobs into sedentary push-button ones. Field studies have revealed that the average daily physical energy expenditure of the modern farmer removes him from the category of a heavy worker. A large factory in Cleveland, Ohio, has found it necessary to institute a program of recess periods each afternoon so that the employees may engage in some sort of physical activity in order to maintain physical fitness. Some epidemiological studies have had difficulty in gathering sufficient numbers of people engaged in heavy labor to make the studies statistically significant. How much this has to do with the increase in coronary atherosclerotic heart disease is still problematical.

TABLE 7
DISTRIBUTION OF WHITE MALES WHO DIED SUDDENLY AND UNEXPECTEDLY FROM CORONARY ATHEROSCLEROTIC HEART DISEASE ACCORDING TO OCCUPATIONAL PHYSICAL ACTIVITY AND AGE

Age	Sedentary activity	Moderate activity	Strenuous activity
Under 55	112 (44%)	81 (31%)	32 (24%)
Over 55	139 (56%)	179 (69%)	106 (76%)
Total	251 (100%)	260 (100%)	141 (100%)

Among the reports of the relationship of the different degrees of occupational physical activity to the morbidity and mortality rates from coronary atherosclerotic heart disease are those of Morris *et al.*[36] in England, Biorck *et al.*[37] in Sweden, and Spain and Bradess[38] in Westchester County, N. Y. In all of these a positive association was noted with the more sedentary types of occupation. In our previously reported post-mortem studies, the individuals in sedentary occupations experienced sudden death more often at a younger age from coronary atherosclerotic heart disease than those in the more strenuous occupations (TABLE 7). In this study cab drivers, accountants, tailors, and bank executives were placed in the sedentary classification. It should be noted that these occupations cut across economic lines. This presumptive association has raised more questions than it has answered. If this association is valid, is the influence of sedentary life related to the developmental phase of the disease (atherogenesis) or with the more frequent onset of such acute episodes as sudden death from myocardial infarction in individuals already exhibiting advanced coronary atherosclerosis? In another study we have found that apparently healthy white males between the ages of 30 and 60 who had died suddenly as a result of various accidents showed no differences, at the various corresponding age levels, in the degree of atherosclerosis as related to occupational physical activity. This would mitigate against the degree of physical activity being related to the developmental phase of the disease.[39]

What, then, is the reason for the higher mortality rate in the younger sedentary individual? Some insight into this may be gained by mention of Eckstein's[40] experiments on dogs in which he demonstrated that the production of partial coronary occlusion followed by exercise of the animals produced a significantly greater degree of intercoronary collateral anastamosis than the same grade of experimental coronary occlusion in animals that were not exercised. Perhaps the same situation applies to man.

However, in our studies on 1500 ethnically-similar males, preliminary data indicate that there is no marked difference in the frequency of clinical coronary atherosclerotic heart disease among the various types of occupations. Of 992 individuals in sedentary and moderately sedentary occupations, between the ages of 30 and 55, 112 individuals had evidence of disease. Similarly 10 of 100 individuals engaged in heavy labor manifested the disease. These latter findings are not necessarily in conflict with our previous autopsy findings on sudden death and the findings of others. Physical activity, as exemplified by the type of occupation, may not exert any influence on the rate or frequency of the development of clinical atherosclerotic heart disease (morbidity) but may, perhaps, affect the length of survival of those who already established evidence of disease (mortality). It is also possible that other atherogenic factors, such as unusually high consumption of animal fats, may so dominate the situation in this particular group of males that they obscure other factors of lesser significance. One must also appreciate the fact that only incomplete information is available on the leisure time activity of these individuals.

Smoking Habits

A parallel situation may exist with reference to the relationship of smoking habits and the incidence of coronary atherosclerotic heart disease. In the extensive survey conducted by Hammond and Horn,[41] a significantly higher mortality rate from heart disease was found in smokers as compared to nonsmokers. Preliminary data in our study reveals no differences in the incidence of coronary atherosclerotic heart disease on an age-comparable basis among heavy, moderate, and nonsmokers and those who have stopped smoking (TABLE 8). Once again the information of the Hammond and Horn study and this one are not necessarily contradictory. Smoking may have no influence on the pathogenesis of the disease but may perhaps exert a deleterious effect on those already afflicted with it. The final determination requires much more study.

Emotional Stress

If emotional stress affects the atherogenic process, then there must be evidence to indicate that emotion exerts some influence on some part of the mechanism implicated in its pathogenesis. These stress factors should be shown to have at least some influence on vascular walls, blood lipid levels, blood coagulability, and/or local hemodynamics such as blood pressure, velocity, and flow.

There is some evidence at the present time to indicate that emotional stress may temporarily raise serum cholesterol levels. This has been demonstrated by serial serum cholesterol studies in medical students during examination time, on accountants during the tax-preparation season, and on Air Force trainees following periods of stressful performance.[42,43] In all of these situations there has been some immediate but transient elevation of the serum cholesterol level. Moderate degrees of physical activity may temporarily lower cholesterol levels.

TABLE 8

INCIDENCE OF CLINICAL CORONARY ATHEROSCLEROTIC HEART DISEASE IN JEWISH MALES CLASSIFIED ACCORDING TO SMOKING HABITS

Smoking habits	Total cases	No. with heart disease
Nonsmokers	427	60 (14%)
Moderate cigarette smokers (less than 1 pack per day)	343	48 (14%)
Heavy cigarette smokers (1 to 3 packs per day)	258	31 (12%)
Cigars	211	29 (14%)
Stopped*†	238	28 (12%)

* Those who had stopped smoking for at least six months prior to examination.

† Those who had stopped smoking because of the development of clinical coronary atherosclerotic heart disease were classified according to their previous smoking habits.

Similar studies also indicate that emotional stress may accelerate blood clotting, but other equally reliable workers found that anxiety not only has no influence on blood coagulation but may actually favor fibrinolysis and thus act in a protective manner.[43,44] However, there are no studies available at the present time to indicate conclusively that emotional stress produces sufficiently profound and long-lasting alterations in serum lipids and blood clotting to affect significantly the tempo of the atherogenic process. In fact even the assumption that the level of serum cholesterol is directly related to the atherogenic process is as yet unproved.

There is, therefore, no current scientific basis for the impression held by some clinicians that mental stress or emotional disturbance enhances or accelerates the atherosclerotic process. As a matter of fact, autopsy studies demonstrate that individuals who have been so emotionally disturbed as to commit suicide had neither greater nor lesser degrees of coronary atherosclerosis than individuals of the same sex, age, race, and from the same community who were killed unexpectedly, as in traffic accidents.[24] One must conclude that there is at present insufficient knowledge, either affirmative or negative, to assess accurately the role of mental stress in the atherogenic process.

The conclusion that anxiety is a frequent aggravating or precipitating factor in acute coronary occlusion is invariably based on retrospective studies. It is well known that when the acute crisis has passed, the presence of serious organic illness will often stimulate introspection in the patient. Inactivity and isolation from the distractions of everyday life, presented by the enforced bed rest, afford ample opportunity for reflection, and people will automatically look for some specific event or activity to blame for the incapacitating attack. The serious nature of the illness will itself create emotional problems that inevitably will be tied to occurrences in the immediate past, to say nothing of the enhancement of hitherto latent problems by the facts and implications of the illness. The examination of such individuals will obviously uncover a greater incidence of anxieties, hostilities, and conflicts than in a "healthy" group of individuals of comparable age, sex, and background. Until findings are available from long-range prospective studies in which individuals of different age, sex, and race have been observed carefully in such matters as occupation, diet, and blood lipids, and upon whom detailed psychological evaluations have been obtained before the acute events, no conclusive interpretations can be made. At present I am unaware of any such completed studies.

Foremost among the arguments used to demonstrate the fact that psychological or emotional stress is an important background factor in the development of coronary occlusion is the widely accepted impression that top business executives who are under constant high pressure because of greater job responsibility have a higher attack rate of acute coronary occlusion than other individuals of the same age. This concept, unfortunately, has been based only on impressions, and is entirely refuted by recent reports of carefully documented and controlled investigations. One such report, based on a 5-year survey of more than 1000 executives as compared to more than 1000 office workers in the same company, concludes that the top management personnel actually had a lower attack rate of acute coronary occlusion than the office clerks.[45] It is important to note that in this study both of the occupational categories were in the sedentary group. Other analyses had come to erroneous conclusions because the sedentary executive groups were compared with physically-active laboring groups. Another study made by the Medical Division of E. I. duPont de Nemours, Inc., Wilmington, Del., concluded that no differences were found in the incidence of myocardial infarction among groups classified according to differences in degree of job responsibility.[46]

In our studies on Jewish males the incidence of clinical coronary atherosclerotic heart disease in more than 300 salesmen, a group that might be considered to be under constant daily pressure, was similar to that in other sedentary or moderately sedentary occupations.

The "broken heart," the "quickened pulse," and the "pounding heart beat" have been used throughout time by novelists and poets as symbols of such emotional disturbances as fear, anxiety, guilt, despair, and unrequited love.

However, it must be remembered that these same palpitations and heart poundings in the chest are also manifestations of desirable emotional experiences such as job achievement, hopeful and eager anticipation, and fulfilled love. The cardiovascular neurasthenic is perhaps the classic example of the individual in whom the central target of psychological conflicts is the heart. Nevertheless these individuals reveal an attack rate of coronary occlusion no greater than the rest of the population.[47] It would seem that the presently acceptable and available information demands that the concept of disturbed emotions as a significant and direct causative factor in coronary occlusion be consigned to our folklore and romance literature. As yet it has not earned a secure place in the scientific understanding of the disease in question.

Society and Coronary Atherosclerosis

There are many other factors and problems to be considered; I have dwelt only on a few of the most obvious. However, even this incomplete story would be lacking if two other considerations concerning the relationship of society, culture, and coronary atherosclerotic heart disease were not at least mentioned.

The first is the impact of this modern epidemic, which strikes down so many males in the prime of life, on the family structure and on the psyche of the male as he nears the danger period confronted by the daily obituary notices of his contemporaries. The second consideration is based on the assumption that within the next decade definitive proof will be forthcoming concerning the key role of animal fats in our diet in the pathogenesis of this disease. Imagine then the socioeconomic struggle that will ensue in the effort to unseat the bull, its mate, and their by-products from the throne of the food kingdom and to replace them with the fish and the stringbean. Imagine the struggle necessary to replace advertisers with responsible and scientific health advisors. Having only recently emerged scarred and nonvictorious from the battlefield of cigarette smoking versus cancer of the lung, I can testify that the dairy and beef trusts, as well as the hamburger and custard stands, will not willingly give up their vested and powerful interests.

Summary and Conclusions

In 1909 A. Ignatowski observed that officers in the Russian Army exhibited more atherosclerosis than pastoral peasants who lived on a vegetable diet. He fed rabbits animal proteins and noted the development of atheromatosis in their aortas.[48] Shortly thereafter Stukkey[49] produced similar changes in rabbits by feeding them egg yolk. In 1913 Anitschkow[50] fed rabbits cholesterol and produced hypercholesterolemia and atherosclerotic changes. In more recent years Snapper[51] speculated that the differences in the degree of atherosclerosis in the Chinese and those of the Western world might be related to differences in unsaturated fatty acid content of the diet. Since then Keys[52] and Bronte-Stewart *et al.*[53] in various geographic population studies have arrived at almost similar conclusions. The cycle thus appears to be complete. Although atherosclerosis was found in the aortas of Pharoah's mummies, most of the clinical manifestations of the disease as observed today appear to be based upon our modern way of life. Since this is man-made, it can also be undone by man. There is sufficient experimental and indirect human evidence to indicate that the process of atherosclerosis can be prevented, arrested and, to a certain extent, reversed.[54-56]

The problems involved in population studies on coronary atherosclerotic heart disease have been presented. These include such factors as: large numbers of individuals with significant degrees of clinically undetectable coronary atherosclerosis; changing degrees of coronary atherosclerosis over a period of time within the same population area; the masking of some factors by the overwhelming influence of other factors; the evaluation of the relative role of genetic and environmental influences; questions of bias and selection in the various groups studied; difficulty in distinguishing between the developmental and clinical stage of the disease; and inadequate methodology and measuring devices.

Within the limits of these difficulties autopsy studies have been presented that indicate a significant and absolute increase in the degree of coronary atherosclerosis in males in this area of the world. This has been accompanied by a relative decrease in the significance of hypertension as a pathogenetic factor and by a shift in the peak occurrence toward a younger age group.

Autopsy studies also indicate that those engaged in sedentary occupations tend to die suddenly from coronary atherosclerosis at a younger age than those engaged in heavy laboring occupations. This appears to be unaccompanied by differences in the degree of coronary atherosclerosis.

Also within the confines of the previously mentioned limitations, preliminary data on several thousand Jewish males in the metropolitan New York area reveals a positive association of mesomorphic body build, hypertension, and higher serum cholesterol levels with clinical coronary atherosclerotic heart disease. No association was found between smoking habits, occupational classification, and uncomplicated obesity with clinical coronary atherosclerotic heart disease.

The place and importance of emotions and psychogenic stimuli in the dynamic complex of altered lipid metabolism, constitutional background, local vascular factors, and altered blood coagulability, and the cortical-visceral pathway through which these may be mediated, have not been established. There is insufficient positive or negative evidence in this area.

References

1. World Health Organization. 1958. Classification of atherosclerotic lesions. World Health Org. Tech. Rept. Ser. No. 177. Geneva, Switzerland.
2. World Health Organization. 1957. Study group on atherosclerosis and ischemic heart disease. World Health Org. Tech. Rept. Ser. No. 177. Geneva, Switzerland.
3. Lansing, A. I., Ed. 1959. The Arterial Wall-aging, Structure and Chemistry. Williams & Wilkins. Baltimore, Md.
4. Duff, G. L. & G. C. McMillen. 1951. Pathology of atherosclerosis. Am. J. Med. **11:** 92.
5. Duguid, J. B. 1955. The etiology of atherosclerosis. Practitioner. **175:** 241.
6. Moon, H. D. & J. F. Rinehart. 1952. Histogenesis of coronary arteriosclerosis. Circulation. **6:** 481.
7. Evans, S. M., H. K. Ihrig, J. A. Means, W. Zeit & E. E. Haushalter. 1952. An *in vitro* study of the pathogenesis of atherosclerosis. Am. J. Clin. Pathol. **22:** 354.

8. Mann, G. V. & F. J. Stare. 1954. Nutrition and atherosclerosis. Symposium, Washington Publ. 338. Natl. Acad. Sci. Natl. Research Council.
9. Mann, G. V., S. B. Andrus, A. McNally & F. J. Stare. 1953. Experimental atherosclerosis in cebus monkeys. J. Exptl. Med. **98:** 195.
10. Roine, P., M. Perkarinen, M. J. Karvonen & J. Kihlberg. 1958. Diet and cardiovascular disease in Finland. Lancet. **2:** 173.
11. Groen, D. & R. M. Van Der Heide. 1959. Atherosclerosis and coronary thrombosis. Medicine. **38:** 1.
12. Brunner, D., G. Manelis & K. Loebl. 1959. Influence of age and race on lipid levels in Israel. Lancet. **1:** 1071.
13. Tejada, C., I. Gori, J. P. Strong & H. C. McGill. 1958. Comparative severity of atherosclerosis in Costa Rica, Guatemala and New Orleans. Circulation. **18:** 92.
14. Henschen, F. 1953. Geographic and historical pathology of arteriosclerosis. J. Gerontol. **8:** 1.
15. Bjurulf, P. 1959. Atherosclerosis and body build. Acta. Med. Scand. **66**. Suppl. 149.
16. Plotz, M. 1957. Coronary Heart Disease. Hoeber-Harper. New York, N. Y.
17. Higginson, J. & W. J. Pepler. 1954. Fat intake, serum cholesterol concentration and atherosclerosis in the South African Bantu. Part II. Atherosclerosis and coronary artery disease. J. Clin. Invest. **33:** 1366.
18. Garn, S. M. 1960. Essay in development and education. White House Conference on Children and Youth. Washington, D. C.
19. Toor, M., J. Agmon & D. Allalouf. 1954. Changes of serum total lipids, total cholesterol and lipid phosphorous in Jewish Yemenite immigrants after twenty years in Israel. Bull. Research Council Israel. **4:** 202.
20. Brock, J. F. & B. Bronte-Stewart. 1956. Arteriosclerosis in African populations. *In* A Symposium on Arteriosclerosis. Minneapolis, Minn. Heart Assoc. and Univ. Minn. Minneapolis, Minn.
21. Berkson, J. 1946. Limitations of the application of fourfold table analyses to hospital data. Biometrics Bull. **2:** 47.
22. Mainland, D. 1953. The risk of fallacious conclusions from autopsy data on the incidence of diseases, with applications to heart disease. Am. Heart. J. **45:** 644.
23. Gore, I. & C. Tejada. 1957. The quantitative appraisal of atherosclerosis. Am. J. Pathol. **33:** 875.
24. Spain, D. M. & V. A. Bradess. 1959. Post-mortem studies on coronary atherosclerosis in one population group. Diseases of the Chest. **36:** 397.
25. Laurie, W. & J. D. Woods. 1958. Atherosclerosis and its cerebral complications in the South African Bantu. Lancet. **1:** 231.
26. Gore, I., W. B. Robertson, A. E. Hirst, G. G. Hadley & Y. Koseki. 1960. Geographic differences in the severity of aortic and coronary atherosclerosis. Am. J. Pathol. **36:** 559.
27. Olson, R. E. 1958. Atherosclerosis—a primary hepatic or vascular disorder? Perspectives in Biol. Med. **2:** 84.
28. Spain, D. M. & V. A. Bradess. The relative frequency of coronary atherosclerotic heart disease as a cause of sudden and unexplained death. J. Am. Med. Assoc. In press.
29. Kretschmer, E. 1921. Korperbau und Character. Berlin, Germany.
30. Kolb, P. 1956. Koronarsklerke und konstitution. Z. Kreislaufforsch. **45:** 73.
31. Sheldon, W. H. 1940. The Varieties of Human Physique. Harper and Bros. New York, N. Y.
32. Gertler, M. M., S. M. Garn & P. D. White. 1951. Young candidates for coronary heart disease. J. Am. Med. Assoc. **147:** 621.
33. Spain, D. M., V. A. Bradess & G. Huss. 1953. Observations on atherosclerosis of the coronary arteries in males under the age of 46: A necropsy study with special reference to somatotypes. Ann. Intern. Med. **38:** 254.
34. Laurie, W. & J. D. Woods. 1958. Anastomoses in the coronary circulation. Lancet. **2:** 812.
35. Stamler, J. 1959. The epidemiology of atherosclerotic coronary heart disease. Postgrad. Med. **25**.
36. Morris, J. N., J. A. Heady, P. A. B. Raffle, O. G. Roberts & J. W. Parks. 1953. Coronary heart disease and the physical activity of work. Lancet. **2:** 1053.
37. Biorck, G., W. Overbeck & C. Gronvall. 1954. Coronary disease and heart infarct in Malmo. Cardiologia. **25:** 232.
38. Spain, D. M. & V. A. Bradess. 1957. Sudden death from coronary atherosclerosis, age, race, sex, physical activity and alcohol. A. M. A. Ann. Internal Med. **100:** 228.
39. Spain, D. M. & V. A. Bradess. Occupational physical activity and degree of coronary atherosclerosis in 'normal' white men. Circulation. In press.

40. Eckstein, R. W. 1957. Effect of exercise and coronary artery narrowing on coronary circulation. Circulation Research. **5:** 230.
41. Hammond, E. C. & D. Horn. 1958. Smoking and death rates—report of 44 months of follow-up of 187,783 men. J. Am. Med. Assoc. **166:** 1159.
42. Friedman, M., R. H. Rosenman & V. Carroll. 1958. Changes in the serum cholesterol and blood clotting time in men subjected to cyclic variation of occupational stress. Circulation. **17:** 852.
43. Sprague, H. B. 1958. Editorial: Emotional stress and the etiology of coronary artery disease. Circulation. **17:** 1.
44. Hammarstein, J. F., C. W. Cathey, R. F. Redmond & S. Wolf. 1957. Serum cholesterol, diet and stress in patients with coronary artery disease. Abstr. Am. Soc. Clin. Invest. Ann. Meeting.
45. Lee, R. E. & R. F. Schneider. 1958. Hypertension and arteriosclerosis in executive and nonexecutive personnel. J. Am. Med. Assoc. **167:** 1447.
46. Pell, S. & C. A. D'Alonzo. 1958. Myocardial infarction in one-year industrial study. J. Am. Med. Assoc. **166:** 332.
47. Cohen, M. E. & D. White. 1951. Life situations, emotions and neurocirculatory asthenia (anxiety, neurosis, neuroasthenia, effort syndrome). Psychosomatic Med. **13:** 355.
48. Ignatowski, A. 1933. Cited by N. Anitschkow. *In* Arteriosclerosis. E. V. Cowdry, Ed. New York, N. Y.
49. Stuckey, N. W. 1912. Über die Veranderungen der Kaminchenaorta der Futterung mit verschiedenen Fettsorten. Cbl. Allgem. Pathol. u. pathol. Anat. **23:** 910.
50. Anitschkow, N. & S. Cholatow. 1913. Über Experimentelle Cholesterinsteatose und ihre Bedentung fur die Entstehung einiger pathologisches Prozesse. Cbl. Allg. Pathol. u. pathol. Anat. **24:** 1.
51. Snapper, I. 1941. Chinese Lessons to Western Medicine. Interscience. New York, N. Y.
52. Keys, A. 1955. Mode of life and prevalence of coronary artery disease. *In* Arteriosclerosis Symposium. Minn. Heart Assoc. and Univ. Minn. Minneapolis, Minn.
53. Bronte-Stewart, B., A. Antones, L. Eoles & J. F. Brock. 1956. Effect of feeding different fats on serum cholesterol level. Lancet. **1:** 521.
54. Katz, L., J. Stamler & R. Peck. 1958. Nutrition and Atherosclerosis. Lea and Febiger. Philadelphia, Pa.
55. Stamler, J., R. Peck & L. N. Katz. 1956. Experiences in assessing estrogen antiatherogenesis in the chick, the rabbit, and man. Ann. N. Y. Acad. Sci. **64**(4): 596.
56. Spain, D. M., I. J. Greesblatt, I. Snapper & T. Cohen. 1956. The degree of coronary and aortic atherosclerosis in necropsied cases of multiple myeloma. Am. J. Med. Sci. **231:** 165.

SOCIOECONOMIC CORRELATES OF ATHEROSCLEROTIC AND HYPERTENSIVE HEART DISEASES*

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For the past several years we have been engaged in a long-term epidemiologic study of cardiovascular diseases. Our initial efforts in this field were an investigation of mortality statistics based on death-certificate data in Chicago and Illinois.[1-5] These studies revealed a higher death rate from cardiovascular-renal diseases in the middle-aged Negro population as compared with the white (TABLE 1).[3] In middle-aged males the death rate from coronary heart disease was similar in the two racial groups, whereas the Negro females had a higher death rate from this disease than the white females.† The death rates from hypertensive disease and cerebrovascular diseases were severalfold greater in Negroes than whites, irrespective of sex.

These studies also revealed uniformly lower death rates from all cardiovascular-renal causes in inhabitants of rural Illinois compared with Chicagoans (TABLE 1).[4] No consistent, marked differences in cardiovascular disease mortality rates were noted for middle-aged males stratified into broad occupation-income groups (TABLES 2 and 3).[3,4] Coronary heart, hypertensive, and cerebrovascular diseases are all frequent causes of death in all socioeconomic strata of the middle-aged Chicago population, white and Negro.

The white foreign-born nationalities in Chicago also exhibited high cardiovascular-renal death rates in middle age (TABLE 4). However, rates for the foreign-born white males as a group tended to be slightly lower than for all Chicagoans. The Italian-American foreign-born manifested the most clear-cut tendency to lower rates. Rates of immigrants tended to be considerably above those observed for these causes in matched age-sex groups in the respective European countries.[5] Apparently these nationalities tend to become Americanized in their middle age disease patterns. Middle-aged men of Chinese-American, American-Indian, and particularly Japanese-American origin exhibited considerably lower coronary disease mortality rates, compared with United States whites and Negroes (TABLE 5).[5]

As discussed at length elsewhere, all these mortality findings are consistent with the concept that aspects of the mode of life—for example, physical inactivity, smoking, and especially diet—play a key role in the etiology of these diseases, particularly atherosclerotic coronary heart disease.[1-5]

More recently our major efforts have been directed toward studies of the living population. One such study has been a comprehensive prospective epidemiologic investigation of hypertension, hypertensive cardiovascular disease, and atherosclerotic coronary heart disease in the labor force of a large Chi-

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† A discussion of the sex differential in susceptibility to coronary disease is beyond the scope of this paper.[1-3,10] Cf. Stamler,[1,2] Stamler *et al.*,[3] and Katz *et al.*[10]

TABLE 1

CHICAGO AND ILLINOIS DEATH RATES, 1951,* AGE 45 TO 54

Sex, race, socioeconomic, and geographic group	All causes	Cardio-vascular-renal diseases	Cerebro-vascular diseases	Arterio-sclerotic heart disease	Arterio-sclerotic and degenerative heart disease	Hyper-tensive disease
White male, Chicago	1271	716	62	405	488	57
White female, Chicago	690	297	67	94	130	42
Nonwhite male, Chicago	1946	1111	145	409	642	200
Nonwhite female, Chicago	1652	955	190	173	393	258
White male, rural Illinois	726	383	51	243	254	21
White female, rural Illinois	466	192	54	53	70	26
Nonwhite male, rural Illinois	1269	761	†	†	†	†
Nonwhite female, rural Illinois	681	262	†	†	†	†

* All death rates are per 100,000 population.
† Too few deaths for rate calculation, small population base.

TABLE 2

1951 DEATH RATES IN THE CHICAGO MALE POPULATION AGED 45 TO 54, BY OCCUPATION

Sex, race, occupation group	All causes	Cardio-vascular diseases	Cerebro-vascular diseases	Arterio-sclerotic heart disease	Arterio-sclerotic and degenerative heart disease	Hyper-tensive disease
White male						
A Professional, technical, official, managerial, proprietary	929	600	68	365	420	53
B Clerical, sales	1453	884	62	559	631	108
C Craftsman, foremen, operatives	973	617	50	370	448	50
D Service workers	1482	834	46	440	614	87
E Laborers	2641*	1476*	75	813*	1048*	107
A + B White-collar	1142	716	65	444	506	76
C + D + E Blue-collar	1197	725	52	419	526	61
All	1174	721	57	405	517	67
Nonwhite male						
A Professional, technical, official, managerial, proprietary	1366	656	†	437	546	†
B Clerical, sales	1324	982	†	256	470	384
C Craftsman, foremen, operatives	1439	766	176	279	404	145
D Service workers	1537	908	103	351	600	88
E Laborers	4298*	2515*	300*	826*	1483*	507*
A + B White-collar	1342	839	†	336	503	264
C + D + E Blue-collar	2168	1233	183	435	727	215
All	1728	1258	158	372		223

* Apparently a falsely high rate.[3] All rates are per 100,000 population.
† Too few deaths for rate calculation.

cago utility corporation. Another has been a survey of serum cholesterol levels in a sample of the Chicago Negro population. The present report summarizes data from both these studies, particularly the correlations between socioeconomic-ethnic-racial and medical findings.

TABLE 3

CHICAGO DEATH RATES, 1953, AGE 45 TO 54, BY MEDIAN INCOME OF CENSUS TRACTS OF RESIDENTS

Sex, race, income group	Arteriosclerotic heart disease	Arteriosclerotic and degenerative heart disease	Hypertensive disease
White male			
I <$2000*	703†	850†	‡
II 2000–2999	308	395	34
III 3000–3999	369	443	41
IV 4000–4999	319	350	38
V 5000 or >	331	384	‡
Nonwhite male			
I <$2000	394	422	191
II 2000–2999	383	535	203
III 3000–3999	191	547	195
IV 4000–4999	‡	‡	‡
V 5000 or >	‡	‡	‡
White female			
I <$2000	267†	267†	†
II 2000–2999	128	156	25
III 3000–3999	109	154	41
IV 4000–4999	72	95	28
V 5000 or >	84	101	†
Nonwhite female			
I <$2000	220	465	196
II 2000–2999	151	321	191
III 3000–3999	‡	268	536
IV 4000–4999	‡	‡	
V 5000 or >	‡	‡	

* Median income of census tract of residence. All death rates are per 100,000 population.
† Apparently a falsely high rate.[4]
‡ Too few deaths for rate calculation, small population base.

Methods

The long-term prospective epidemiologic study of the male population age 40 to 59 employed by a large Chicago utility company was initiated on January 2, 1958. This population totaled 1596 men. A complete medical examination was available in the company medical department on an annual (persons age 50 to 59) or biennial (persons age 40 to 49) basis for all employees. It consisted of a thorough history and physical examination, 12-lead electrocardiogram, 6-m. posteroanterior roentgenogram of the chest, urinalysis, serologic test for syphilis, and serum cholesterol. All procedures were standardized for research purposes.

The complete medical record of each participant, including the 1958 examina-

TABLE 4

DEATH RATES* FOR FOREIGN-BORN WHITE CHICAGO AREA† RESIDENTS, 1951, BY COUNTRY OF ORIGIN, AGE 45 TO 54

Sex, nationality group	All causes	Cardio-vascular-renal diseases	Cerebro-vascular diseases	Arterio-sclerotic heart disease	Arterio-sclerotic and degenerative heart disease	Hyper-tensive disease
White male—all	1151	650	59	379	445	53
All foreign born	1065	566	59	317	387	43
Foreign-born Scandinavian	1091	573	82	300	355	14
Foreign-born German	1001	501	54	283	316	65
Foreign-born Italian	847	467	57	248	324	10
Foreign-born Polish	1470	793	57	460	563	92
Foreign-born Russian‡	1094	667	40	440	507	27
White female—all	636	268	63	83	111	36
All foreign born	622	256	61	91	126	29
Foreign-born Scandinavian	423	58	‡	39	39	‡
Foreign-born German	521	165	64	38	64	13
Foreign-born Italian	400	158	36	61	61	12
Foreign-born Polish	823	404	70	140	210	70
Foreign-born Russian‡	470	208	55	55	83	28

* All death rates are per 100,000 population; nationalities are included when the population base was 5000 or > for the specific age-sex group.

† The Chicago Area includes the five Illinois counties of the Chicago Standard Metropolitan Area.

‡ A high percentage of these were Jewish.

TABLE 5

DEATH RATES* FOR AMERICAN INDIANS, CHINESE-AMERICANS, JAPANESE-AMERICANS, UNITED STATES WHITES AND UNITED STATES NEGROES, AGE 45 TO 54†

Sex, race group	All causes	Cardio-vascular-renal diseases	Cerebro-vascular diseases	Arterio-sclerotic heart disease	Arterio-sclerotic and degenerative heart disease	Hyper-tensive disease
Male						
Chinese-Americans	1533	572	96	225	257	118
Japanese-Americans	712	289	55	137	145	35
American-Indians	1489	443	69	203	226	46
United States whites	1006	522	55	330	351	42
United States Negroes	1913	949	213	261	334	222
Female						
Chinese-Americans	724	379	118	67	84	118
Japanese-Americans	487	242	106	40	48	47
American-Indians	1162	334	65	75	102	69
United States whites	547	219	55	67	77	36
United States Negroes	1575	883	249	168	220	247

* All death rates are per 100,000 population.

† The Chinese- and Japanese-Americans are the foreign born of that nationality; for the Chinese-Americans, the Japanese-Americans, and the American Indians, rates are 4-year averages (1949 through 1952); white and Negro rates are for the single year 1950.

tion, was individually reviewed by the research group's internist (D.M.B.). At the same time the 1958 electrocardiogram and all previous electrocardiograms were reviewed. The chest X rays had been previously interpreted by a radiologist; his reports were utilized in arriving at the final definitive diagnoses. The criteria and classification of disease (definite and suspect) have been described previously.[6-8] Definite hypertension was defined as a diastolic blood pressure of 95 mm. Hg or greater for most of the recorded readings in recent years. Borderline hypertension was diagnosed in individuals with diastolic levels of 90 through 94 mm. Hg. A diagnosis of hypertensive heart disease necessitated the presence of diastolic hypertension plus electrocardiographic evidence of left heart strain and/or X-ray evidence of cardiomegaly. The socioeconomic data were obtained from the personnel records of the entire group.

At this writing, data are available on 1364 (85.5 per cent) of the 1596 men constituting the population base for this study. Data on 126 others are in process of being compiled; 106 are nonparticipants in the periodic examination program. This report presents data on 1364 men.

The survey of serum cholesterol levels in Chicago Negroes encompassed 1395 men and women age 25 to 64. Bloods were obtained through the cooperation of the Chicago Board of Health–United States Public Health Service venereal disease detection program. Their community survey efforts were concentrated among residents of lower income areas. Limited socioeconomic data were collected, including place of birth, date of migration North if born in the South, employment status, occupation, and industry. Height and weight were also obtained by interview. The results of this survey form the second part of this report.

Results

The utility company study. The prevalence rates of the various diseases for the group as a whole are summarized in TABLE 6. Evaluation of cardiovascular-renal disease by age generally revealed a greater prevalence of disease with advancing age (TABLE 7). This increase in prevalence rates applied to hypertension, hypertensive heart disease, and coronary heart disease. It was not noted for hypercholesterolemia, obesity, or heavy smoking in this 40-to-59 age span.

Analysis of prevalence data by race was complicated by the fact that the Negro employees of this company were as a group younger than the white (TABLE 8). The prevalence rates for the white group were therefore age-adjusted to correspond to the age distribution of the Negroes. Of the Negroes, 16.1 per cent had a 1958 diastolic blood pressure of 100 mm. Hg, or greater, as compared with 6.5 per cent of the whites; 25.3 per cent of the Negroes were diagnosed as having diastolic hypertension, and 11.5 per cent had hypertensive heart disease. The comparable age-adjusted rates for the whites were 11.5 per cent and 2.4 per cent respectively. Thus hypertensive disease was 2.2 to 4.8 times more common in Negroes than whites. The prevalence rates for coronary heart disease and obesity were similar in the two racial groups. The data on distribution of serum cholesterol levels revealed a greater percentage of Negroes in the range below 225 mg. per cent as compared with the whites. The mean serum cholesterol level was 227.3 for the Negroes, 239.2 mg. per cent for the whites, a statistically significant difference. Heavy smoking was much less common among the Negroes than the whites.

TABLE 6

OVER-ALL PREVALENCE OF CARDIOVASCULAR-RENAL DISEASES, DIABETES MELLITUS, AND OTHER FINDINGS, CHICAGO UTILITY COMPANY STUDY, 1364 MEN AGE 40 TO 59, 1958

Diagnosis or finding	Prevalence rate per 1000 men*
All cardiovascular-renal diseases**	309
Diastolic pressure, 1958, 90 or >	215
Diastolic pressure, 1958, 100 or >	81
Definite hypertension	137
Borderline hypertension	65
Hypertensive heart disease	36
Definite coronary heart disease—all types	48
Myocardial infarction	21
Angina pectoris	18
Acute coronary insufficiency	10
Chronic heart disease of probable coronary etiology	8
Suspect coronary heart disease	114
Rheumatic heart disease	7
Cerebrovascular diseases	2
Diabetes mellitus	15
Nephritis	7
Renal calculi	3
Wt./des. wt.† <1.05	207
1.05–1.14	246
1.15–1.24	253
1.25 or >	293
Serum cholesterol <225	400
225–259	322
260 or >	279
300 or >	83
Mean serum cholesterol—mg.%	239.2 ± 1.3‡
History of heavy smoking	474

* All prevalence rates in this and subsequent tables are per 1000 persons. The population base is 1364 men age 40 to 59 on Jan. 1, 1958.

** This generic grouping includes all the cardiovascular-renal diseases, as defined in the International Statistical Classification of Diseases and Causes of Death (7th ed.), including hypertension, with or without concomitant findings in the heart and/or blood vessels.

† Wt./des. wt. is the ratio of recorded weight to desirable weight for height; desirable weight values were obtained from the published tables of the Metropolitan Life Insurance Company.[9]

‡ The standard error of the mean is 1.3.

When the study population was stratified by level of educational attainment, it was noted that rates of hypertension and hypertensive heart disease tended to be higher in the groups with less educational background (TABLE 9). However, the group with the least education contained a higher percentage of Negroes and older men, compared with the more educated groups. These confounding variables probably account at least in part for the observed differences.

TABLE 7
AGE AND PREVALENCE OF DISEASES, CHICAGO UTILITY COMPANY STUDY, 1958

Age:	40–44	45–49	50–54	55–59
Number:	328	306	392	338
Diagnosis or finding	Age-specific prevalence rate per 1000 men			
All C-V-R diseases*	216	281	344	382
Diastolic pressure, 1958, 90 or >	149	203	248	251
Diastolic pressure, 1958, 100 or >	58	69	87	106
Definite hypertension	104	104	156	178
Hypertensive heart disease	21	29	41	50
Definite coronary heart disease	18	42	51	80
Suspect coronary heart disease	85	95	135	133
Myocardial infarction	3	7	31	41
Wt./des. wt. <1.05	232	219	176	207
1.05–1.14	235	193	263	285
1.15–1.24	241	275	245	255
1.25 or >	291	314	315	252
Serum cholesterol <225	418	431	365	393
225–259	335	271	344	328
260 or >	247	297	291	278
300 or >	70	108	87	68
Mean serum cholesterol, mg.%	234 ± 2.5	240 ± 2.7	242 ± 2.2	241 ± 2.6
History of heavy smoking	497	526	452	429

* C-V-R is cardiovascular-renal.

TABLE 8
RACE AND PREVALENCE OF DISEASE, CHICAGO UTILITY COMPANY STUDY, 1958

Race:	White		Negro	
Number:	1253	100.0%	87	100.0%
Age 40–44	288	23.0	37	42.5
45–49	280	22.4	22	25.3
50–54	369	29.4	16	18.4
55–59	316	25.2	12	13.8
Diagnosis or finding	Race-specific prevalence rate per 1000 men			
All C-V-R disease	303*	272†	391	
Diastolic pressure, 1958, 90 or >	210	188	276	
Diastolic pressure, 1958, 100 or >	75	65	161	
Definite hypertension	129	115	253	
Hypertensive heart disease	30	24	115	
Definite coronary heart disease	49	37	46	
Suspect coronary heart disease	113	102	138	
Myocardial infarction	22	15	11	
Wt./des. wt. <1.05	207	207	241	
1.05–1.14	249	249	195	
1.15–1.24	252	252	207	
1.25 or >	292	292	356	
Serum cholesterol <225	388	402	540	
225–259	329	321	218	
260 or >	283	277	241	
300 or >	85	83	69	
Mean serum cholesterol, mg.%	239.2 ± 1.3		227.3 ± 4.1	
History of heavy smoking	502	522	287	

* Uncorrected.
† Age-corrected to the age composition of the Negro men.

Although there are some variations in coronary heart disease prevalence among the groups with different levels of education, there is no definite trend. The data on all cardiovascular-renal diseases, serum cholesterol, obesity, and heavy smoking revealed no consistent differences in the several groups.

Division of the population into salaried versus wage earners and indoor versus outdoor workers revealed no sizable differences in any of the variables (TABLE 10). The few differences noted—for example, in coronary heart disease prevalence rates—probably reflect the fact that the outdoor and the wage workers are, as groups, younger than the indoor and the salaried.

TABLE 9

EDUCATION AND PREVALENCE OF DISEASE,* CHICAGO UTILITY COMPANY STUDY, 1958

Education:	1–8 Years		High school, not graduate		High school graduate		College, not graduate		College graduate	
Number:	579	100.0%	364	100.0%	176	100.0%	140	100.0%	97	100.0%
Age: 40–44	92	15.9	103	28.3	66	37.5	42	30.0	22	22.8
45–49	101	17.4	94	25.8	47	26.7	40	28.6	23	23.7
50–54	183	31.6	100	27.5	45	25.6	41	29.3	21	21.6
55–59	203	35.1	67	18.4	18	10.2	17	12.1	31	32.0
Race: white	504	89.8	314	94.9	167	96.5	133	95.7	95	100.0
Negro	57	10.2	17	5.1	6	3.5	6	4.3	0	0.0

Diagnosis or finding	Education: group-specific prevalence rate per 1000 men				
All C-V-R diseases	319	319	295	271	289
Diastolic pressure, 1958, 90 or >	225	220	210	193	175
Diastolic pressure, 1958, 100 or >	93	85	51	64	72
Definite hypertension	159	146	102	86	103
Hypertensive heart disease	47	33	34	21	10
Definite coronary heart disease	57	49	34	29	52
Suspect coronary heart disease	105	113	102	129	175
Myocardial infarction	26	22	11	14	21
Wt./des. wt. <1.05	197	232	204	165	247
1.05–1.14	244	257	199	295	237
1.15–1.24	231	265	301	259	247
1.25 or >	328	246	295	281	268
Serum cholesterol <225	437	398	347	308	423
225–259	307	327	318	372	319
260 or >	256	275	335	321	257
300 or >	71	85	142	71	62
Mean	235.9	239.5	248.3	241.3	235.4
	± 2.0	± 2.6	± 3.7	± 3.8	± 4.5
History of heavy smoking	437	516	591	486	320

* Eight members of the working force who had no formal education are excluded from this table.

Division by income likewise revealed some apparent group differences that probably relate to the differing age-race composition of the groups, rather than their differing income levels (TABLE 11). Other differences—for example, among the three higher income groups in hypertensive and coronary heart disease prevalence—are apparently not related to age-race composition. Further follow-up currently in progress—particularly the collection of incidence data (rates of development of disease *de novo* over several years)—is necessary to assess the meaning of these differences.

Stratification of this labor force based on physical activity of work revealed that there was a disproportionate distribution of age and race among the three groups (TABLE 12). With due allowance for the influences of these confounding variables, the data may be interpreted as indicating no consistent, sizable association between physical activity of work and the recorded prevalence rates.

TABLE 10

PLACE OF WORK, METHOD OF PAYMENT, AND PREVALENCE OF DISEASE, CHICAGO UTILITY COMPANY STUDY, 1958*

Place of work; method of payment:	Indoor		Outdoor		Salary		Wage	
Number:	628	100.0%	662	100.0%	606	100.0%	718	100.0%
Age: 40–44	112	17.8	184	27.8	80	13.2	229	31.9
45–49	143	22.8	146	22.1	150	24.8	150	20.9
50–54	198	31.5	180	27.2	203	33.5	181	25.2
55–59	175	27.9	152	23.0	173	28.5	158	22.0
Race: white	595	96.9	582	90.1	588	98.5	620	89.0
Negro	19	3.1	64	9.9	9	1.5	77	11.0
Diagnosis or finding	Place of work, method of payment: group-specific prevalence rate per 1000 men							
All C-V-R diseases	324		297		328		292	
Diastolic pressure, 1958, 90 or >	229		210		236		201	
Diastolic pressure, 1958, 100 or >	84		79		84		78	
Definite hypertension	132		146		140		136	
Hypertensive heart disease	43		29		36		35	
Definite coronary heart disease	56		44		58		42	
Suspect coronary heart disease	135		94		145		79	
Myocardial infarction	29		15		28		15	
Wt./des. wt. <1.05	225		195		224		201	
1.05–1.14	255		231		253		238	
1.15–1.24	244		261		238		264	
1.25 or >	275		311		285		296	
Serum cholesterol <225	385		420		374		426	
225–259	333		316		336		314	
260 or >	282		265		289		260	
300 or >	83		88		76		89	
Mean	238.5 ± 1.8		239.5 ± 2.0		239.7 ± 1.9		238.2 ± 1.8	
History of heavy smoking	457		485		475		469	

* Of the total study population (1364 men), 74 worked both indoors and outdoors, 40 were paid by salary plus commission; these are excluded from these tabulations.

Division of the population by nativity again revealed significant differences among the groups in age-race composition (TABLE 13). The foreign-born groups were older and essentially all white. A further tabulation was therefore made to permit a direct comparison of whites, native-born and foreign-born (TABLE 14). Despite the fact that they are as a group considerably older than the native-born whites, the foreign-born had prevalence rates no higher than, and in some cases lower than, those of the native-born.

The low-income Negro community study. Mean data on serum cholesterol revealed no rise with age in the Negro male groups after the age of 30 (TABLE 15). Mean values were consistently below 210 mg. per cent, and prevalence rates of hypercholesterolemia were correspondingly low (TABLE 16, *cf.* TABLE 8). Cholesterol levels in the Negro women rose with age, and were significantly higher than the male concentrations upward from age 45. The groups of middle-aged Negro women also exhibited marked obesity (TABLE 15). Stratification by employment status and by occupation revealed no significant differences based on these variables (TABLES 17 and 18).

TABLE 11

HOURLY INCOME AND PREVALENCE OF DISEASE, CHICAGO UTILITY COMPANY STUDY, 1958*

Hourly income:	$1.07–2.65		$2.66–2.93		$2.94–2.99		$3.00–3.49		$3.50–5.66		Voucher	
Number:	242	100.0%	180	100.0%	278	100.0%	285	100.0%	227	100.0%	152	100.0%
Age: 40–44	80	33.1	70	38.9	92	33.1	36	12.6	23	10.0	27	17.8
45–49	57	23.6	36	20.0	66	23.7	55	19.3	51	22.5	42	27.6
50–54	55	22.7	46	25.6	67	24.1	94	33.0	76	33.5	53	34.8
55–59	50	20.7	28	15.6	53	19.1	100	35.2	77	33.9	30	19.8
Race: white	157	66.8	168	96.6	271	99.6	279	99.6	222	99.6	150	100.0
Negro	78	33.2	6	3.4	1	0.4	1	0.4	1	0.4	0	0.0
Diagnosis or finding	Hourly income: group-specific prevalence rate per 1000 men											
All C-V-R diseases	347		239		298		330		295		329	
Diastolic pressure, 1958, 90 or >	194		156		219		260		220		211	
Diastolic pressure, 1958, 100 or >	99		56		76		95		88		53	
Definite hypertension	157		105		129		158		141		112	
Hypertensive heart disease	45		22		22		63		35		13	
Definite coronary heart disease	41		56		61		32		62		39	
Suspect coronary heart disease	140		44		83		88		145		210	
Myocardial infarction	12		22		22		14		40		20	
Wt./des. wt.												
<1.05	257		239		194		180		204		171	
1.05–1.14	241		278		253		222		239		257	
1.15–1.24	220		222		299		268		252		230	
1.25 or >	282		261		252		331		305		342	
Serum cholesterol												
<225	443		456		358		435		326		375	
225–259	322		283		371		266		375		303	
260 or >	236		261		270		298		300		322	
300 or >	74		72		108		67		79		105	
History of heavy smoking	355		511		525		488		493		461	

* For those on salary or salary plus commission, an hourly income was estimated based on their annual income.

Discussion

The only marked, clear-cut differences observed among the several socioeconomic-ethnic-racial groups studied were between whites and Negroes. In the utility company study Negroes exhibited severalfold higher prevalence rates of hypertension and hypertensive heart disease as compared with whites. These findings are consistent with extensive mortality data and oft-noted clinical impressions. Undoubtedly Negroes in the United States have more hypertensive disease than whites. This is a basic fact of the epidemiology of hypertensive disease that needs further intensive follow-up.

TABLE 12

PHYSICAL ACTIVITY OF WORK AND PREVALENCE OF DISEASE,*
CHICAGO UTILITY COMPANY STUDY, 1958

Physical activity of work:	Sedentary		Light		Medium	
Number:	416	100.0%	767	100.0%	177	100.0%
Age: 40–44	59	14.2	187	24.4	79	44.6
45–49	94	22.6	177	23.1	34	19.2
50–54	142	34.1	212	27.6	38	21.5
55–59	121	29.1	191	24.9	26	14.7
Race: white	408	99.5	711	95.2	124	71.7
Negro	2	0.5	36	4.8	49	28.3
Diagnosis or finding	Physical activity of work: group-specific prevalence rate per 1000 men					
All C-V-R diseases	317		308		294	
Diastolic pressure, 1958, 90 or >	228		220		158	
Diastolic pressure, 1958, 100 or >	77		86		68	
Definite hypertension	125		145		136	
Hypertensive heart disease	41		34		34	
Definite coronary heart disease	60		40		56	
Suspect coronary heart disease	156		99		79	
Myocardial infarction	29		17		26	
Wt./des. wt. <1.05	236		178		271	
1.05–1.14	255		241		249	
1.15–1.24	221		288		181	
1.25 or >	286		294		299	
Serum cholesterol <225	363		395		508	
225–259	339		317		294	
260 or >	299		288		198	
300 or >	87		90		45	
Mean	241.2 ± 2.3		239.6 ± 1.7		230.4 ± 3.8	
History of heavy smoking	459		499		401	

* N for this table is 1360; four of the 1364 were assessed as being heavy workers.

The data of the utility company study and, particularly, of the community study indicate that middle-aged Negro men have significantly lower serum cholesterol levels than age-matched white men. Further work is necessary to clarify the causes of this racial difference in cholesterolemia, and particularly the possible role of such factors as diet and habitual physical activity. The fact that Negro men from the low-income community had lower cho-

TABLE 13

NATIVITY AND PREVALENCE OF DISEASE, CHICAGO UTILITY COMPANY STUDY, 1958

Nativity:	Native born		Foreign-born Irish		All foreign born	
Number:	1088	100.0%	173	100.0%	276	100.0%
Age: 40–44	305	28.0	14	8.1	23	8.3
45–49	261	24.0	23	13.3	45	16.3
50–54	301	27.7	65	37.6	91	33.0
55–59	221	20.3	71	41.0	117	42.4
Race: white	983	92.0	167	100.0	264	99.6
negro	86	8.0	—	0.0	1	0.4
Diagnosis or finding	Nativity: group-specific prevalence rate per 1000 men					
All C-V-R diseases	304		353		326	
Diastolic pressure, 1958, 90 or >	224		185		178	
Diastolic pressure, 1958, 100 or >	85		69		62	
Definite hypertension	140		145		127	
Hypertensive heart disease	36		46		36	
Definite coronary heart disease	46		64		58	
Suspect coronary heart disease	126		81		65	
Myocardial infarction	20		23		25	
Wt./des. wt. <1.05	207		197		206	
1.05–1.14	245		225		250	
1.15–1.24	253		266		257	
1.25 or >	295		312		286	
Serum cholesterol <225	390		462		435	
225–259	322		272		322	
260 or >	288		266		242	
300 or >	90		35		54	
Mean	240.1 ± 1.4		233.0 ± 3.5		235.8 ± 2.8	
History of heavy smoking	484		428		431	

TABLE 14

NATIVITY AND PREVALENCE OF DISEASE, CHICAGO UTILITY COMPANY STUDY, 1958

Nativity:	Native-born white		Foreign-born Irish		All foreign born	
Number:	971	100.0%	173	100.0%	276	100.0%
Age: 40–44	265	27.4	14	8.1	23	8.3
45–49	235	24.2	23	13.3	45	16.3
50–54	279	28.7	65	37.6	91	33.0
55–59	192	19.7	71	41.0	117	42.4
Diagnosis or finding	Nativity: group-specific prevalence rate per 1000 men					
All C-V-R diseases	296		353		326	
Diastolic pressure, 1958, 90 or >	218		185		178	
Diastolic pressure, 1958, 100 or >	76		69		62	
Definite hypertension	128		145		127	
Hypertensive heart disease	28		46		36	
Definite coronary heart disease	46		64		58	
Suspect coronary heart disease	126		81		65	
Myocardial infarction	22		23		25	
Wt./des. wt. <1.05	206		197		206	
1.05–1.14	248		225		250	
1.15–1.24	250		266		257	
1.25 or >	293		312		286	
Serum cholesterol <225	376		462		435	
225–259	331		272		322	
260 or >	294		266		242	
300 or >	93		35		54	
Mean serum cholesterol, mg.%	241.5 ± 1.5		233.0 ± 3.5		235.8 ± 2.8	
History of heavy smoking	518		428		431	

TABLE 15

MEAN SERUM CHOLESTEROL LEVELS AND WEIGHTS BY AGE AND SEX, LOW-INCOME NEGRO COMMUNITY STUDY, 1958

Age	Men			Women		
	Number	Wt./des. wt.	Serum cholesterol (mg.%)	Number	Wt./des. wt.	Serum cholesterol (mg.%)
25–29	77	1.07	184.5 ± 4.0	91	1.06	186.9 ± 4.0
30–34	78	1.10	204.9 ± 6.0	83	1.05	192.3 ± 4.2
35–39	77	1.14	202.6 ± 4.9	103	1.11	195.6 ± 3.8
40–44	90	1.07	207.5 ± 5.6	91	1.22	205.7 ± 5.0
45–49	94	1.13	207.6 ± 4.2	102	1.28	222.9 ± 5.2
50–54	92	1.15	204.9 ± 4.0	88	1.30	234.9 ± 6.0
55–59	88	1.11	208.3 ± 4.4	102	1.31	233.4 ± 5.4
60–64	77	1.15	208.3 ± 6.1	88	1.18	239.6 ± 5.4
All	673	1.12	203.8 ± 1.7	748	1.19	214.1 ± 1.6

TABLE 16

DISTRIBUTION OF SERUM CHOLESTEROL LEVELS BY AGE AND SEX, LOW-INCOME NEGRO COMMUNITY STUDY, 1958

Cholesterol	Age 25 to 44		Age 45 to 64	
	Male	Female	Male	Female
<150 mg.%	112[*]	141	97	45
150–174	186	155	111	84
175–199	245	313	205	163
200–224	189	168	274	155
225–249	137	149	177	208
250–274	84	24	77	147
275–299	22	24	31	100
300 and >	25	24	28	97
<225	732	777	687	447
225–259	184	159	208	256
260 or >	84	64	105	297
300 or >	25	24	28	97
Mean, mg.%	200.2	195.2	207.2	232.4

[*] All values are prevalence rates per 1000 persons.

TABLE 17

MEAN SERUM CHOLESTEROL LEVELS BY SEX AND EMPLOYMENT STATUS, LOW-INCOME NEGRO COMMUNITY STUDY, 1958

Employment status	Sex	No.	Cholesterol (mg.%)	Wt./des. wt.
Employed	Male	409	206.4 ± 2.1[*]	1.12
Unemployed	Male	246	198.7 ± 3.2	1.11
Employed	Female	177	210.9 ± 3.7	1.19
Unemployed	Female	69	215.4 ± 6.5	1.17
Housewives	Female	494	215.3 ± 2.4	1.20

[*] Standard error of the mean.

lesterol levels than the Negro men employed by the utility company suggests that environmental factors correlating at least partially with income—and not racial hereditary factors—are of decisive importance in accounting for the observed patterns of cholesterolemia.

The data on Negro-white differences emerging from these two studies may throw some light on the long-standing problem of the comparative rates of occurrence of coronary heart disease in Negroes and whites. It has frequently been stated that Negroes have lower coronary heart disease rates than whites.* On the other hand, limited data are available suggesting that, for middle-aged men at least, the rates may be similar (TABLES 1–3, 5, 8); they may be higher in middle-aged Negroe females than white women. As has been clearly demonstrated, hypertension increases the risk of coronary disease in middle-aged men.[1,2,6,7,11-13] Therefore based on this variable alone, Negroes—with much higher prevalence rates of hypertension than whites—should have correspondingly higher coronary disease rates than whites. While this may be the situation in women, it does not appear to be the case in men. Based on the data of the present study, it may be hypothesized that lower prevalence rates of hypercholesterolemia and heavy smoking may exert a counteracting influence—opposite to that of hypertension—on coronary disease rates in Negro men. In Negro women, on the contrary, high prevalence rates for hypertension, obesity, and hypercholesterolemia would indicate a higher incidence of coronary disease, in keeping with the reported mortality data. Further work is necessary to test this hypothesis.

TABLE 18

MEAN SERUM CHOLESTEROL LEVELS BY SEX AND OCCUPATION, LOW-INCOME NEGRO COMMUNITY STUDY, 1958

Occupation	Sex	No.	Cholesterol (mg.%)	Wt./des. wt.
Not reported	Male	91	203.1 ± 5.2†	1.14
White-collar	Male	74	198.2 ± 4.7	1.08
Blue-collar	Male	504	204.8 ± 2.0	1.12
Not reported	Female	32	195.6 ± 7.3	1.18
White-collar	Female	35	200.3 ± 7.9	1.13
Blue-collar	Female	177	216.6 ± 3.9	1.19
Housewives	Female	504	215.3 ± 2.3	1.20

† Standard error of the mean.

The prevalence data from the utility company study also suggest lower rates in the foreign-born as compared with the native-born whites. These apparent differences are consistent with the results of our previous study in 784 male employees of this company age 50 to 59 on January 1, 1954.[6] In this earlier study 4-year incidence rates for coronary heart disease were significantly lower in the foreign-born than in the native-born. While the differences presently recorded are not large, they merit careful follow-up over the next several years.

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* For a review of the literature on this problem, see Stamler,[1,2] Stamler *et al.*,[3] and Katz *et al.*[10]

The chief impression derived from this preliminary analysis of the utility company data is that the prevalence rates for the several recorded conditions—including hypertension, hypercholesterolemia, obesity, and heavy smoking—all tend to be similar in the various socioeconomic strata of this working population irrespective of education, type of work, or income. These observations are in accord with the findings of other recent studies.[1-3,6,7,10-13]

The foregoing abnormalities—manifest with high prevalence rates in the several aforementioned socioeconomic groups—are associated with increased risk of coronary and/or hypertensive heart diseases. The concomitant finding of high prevalence rates for these two types of heart disease in these socioeconomic groups is therefore an anticipated result. It is also a result consistent with our previous observations in this labor force.[2,6,7] However, data on the prevalence of these diseases are of limited reliability. Therefore definitive conclusions must await the acquisition of incidence data over the next several years.

In any case the similar high prevalence rates in most strata of this working population reaffirms the conclusion that the causative factors at work cut across these socioeconomic groupings.[6] Our long-term prospective study has under investigation several other factors, including dietary and physical activity patterns, which may play an etiologic role in these diseases.

Summary

Data have been presented from earlier studies on cardiovascular-renal disease mortality in different socioeconomic-ethnic-racial strata of the middle-aged population of Chicago, of Illinois, and of the United States. In terms of these same correlates, the preliminary results were presented of a continuing epidemiologic study of hypertension, hypertensive heart disease, and coronary heart disease in strata of the Chicago living population.

For white males high prevalence rates were generally observed for obesity, hypercholesterolemia, hypertension, heavy smoking, hypertensive heart disease, and atherosclerotic coronary heart disease: irrespective of stratification into socioeconomic subgroups. However, a trend was observed toward lower rates in foreign-born than native-born whites. For Negro males prevalence rates of obesity and coronary heart disease were generally similar to those for whites; prevalence rates for hypertension and hypertensive heart disease were significantly higher; prevalence rates for hypercholesterolemia and heavy smoking were significantly lower. The detailed findings illuminate problems of the natural history, epidemiology, and etiology of atherosclerotic coronary heart disease in the middle-aged United States population of varying socioeconomic, ethnic, and racial backgrounds.

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References

1. Stamler, J. 1958. Epidemiology as an investigative method for the study of human atherosclerosis. J. Natl. Med. Assoc. **50:** 161.
2. Stamler, J. 1959. The epidemiology of atherosclerotic coronary heart disease. Postgrad. Med. **25:** 610, 685.
3. Stamler, J., M. Kjelsberg & Y. Hall. Epidemiological studies on cardiovascular-renal diseases in Chicago and Illinois. I. Analysis of mortality trends by age-race-sex-occupation. J. Chronic Diseases. In press.
4. Kjelsberg, M. & J. Stamler. Epidemiological studies on cardiovascular-renal diseases in Chicago and Illinois. II. Analysis of mortality by age-race-sex-place of residence, including urban-rural comparisons. J. Chronic Diseases. In press.
5. Stamler, J., M. Kjelsberg, Y. Hall & N. Scotch. Epidemiological studies on cardiovascular-renal diseases. III. Analysis of mortality by age-sex-nationality. J. Chronic Diseases. In press.
6. Stamler, J., H. A. Lindberg, D. M. Berkson, A. Shaffer, W. Miller & A. Poindexter with the assistance of M. Colwell & Y. Hall. 1960. Prevalence and incidence of coronary heart disease in strata of the labor force of a Chicago industrial corporation. J. Chronic Diseases. **11:** 405.
7. Stamler, J., H. A. Lindberg, D. M. Berkson, A. Shaffer, W. Miller & A. Poindexter with the assistance of M. Colwell & Y. Hall. 1959. Epidemiological analysis of hypertension and hypertensive disease in the labor force of a Chicago utility company. 7th Ann. Proc. Council for High Blood Pressure Research. Am. Heart Assoc. **7:** 23.
8. Stamler, J., Q. D. Young, D. M. Berkson, Y. Hall, M. Lichtman, A. Shaffer, H. Lasky, D. Wallace, C. Estrada & A. Creticos. 1959. Methodological evaluation of the validity and reliability of a special cardiovascular medical examination. A report submitted to Natl. Health Survey. U. S. Public Health Service.
9. Recommended Dietary Allowances. 1958. A report of the Food and Nutrition Board. Natl. Acad. Sci.–Natl. Research Council Publ. 589.
10. Katz, L. N., J. Stamler & R. Pick. 1958. Nutrition and Atherosclerosis. Lea & Febiger. Philadelphia, Pa.
11. Measuring the Risk of Coronary Heart Disease in Adult Population Groups. 1957. A Symposium. Am. J. Public Health. **47**(4): Part 2.
12. Prevention and Control of Coronary Heart Disease. 1960. A symposium. Am. J. Public Health. **50**(3): Part 2.
13. Stamler, J. 1960. Current status of the dietary prevention and treatment of atherosclerotic coronary heart disease. Progr. in Cardiovascular Disease. **3:** 56.

DISCUSSION OF PART I

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As J. May has pointed out, classical medicine considered primarily the immediate causes of disease, such as bacteria and injuries. There is now an increasing awareness of culture as determining the incidence and nature of disease: directly through psychological aspects as well as by the determination of the nature of the environmental stresses encountered. Another aspect of culture, which will be discussed elsewhere in the monograph, is the tailoring of medical advice to fit culture so that the advice will be followed.

To criticize the contributors in a monograph on culture, society, and health for generally ignoring heredity is as foolish as it would be to criticize the contributors in a monograph on human genetics for largely ignoring culture. Nevertheless it should be remembered that both culture and heredity are always part of the picture. The preceding papers have rightly emphasized environment as determined by culture, and disease in turn as affected by the environment. However, biological and constitutional or genetic factors are also of great importance. L. C. Dunn discussed this aspect and also the interaction of genetic endowment with environment. There are still frequent discussions about the relative importance of environment and heredity. Both of these are essential since no individual can exist without hereditary endowment or without environment. What actually happens depends on the interaction of these two factors, and the relative importance of environmental changes and genetic variability is primarily a function of the amount of variation of each of these factors within a given population. The question makes sense only in terms of relative contributions to total variability.

Thus studies within relatively homogeneous white populations have shown that cancer of the stomach, large intestine, and breast have a genetic component, but that generally environmental factors seem to be more important for cancer. It is also known that different racial groups have different cancer patterns, as W. B. Quisenberry has already pointed out. Since genetic variability is more diverse between such groups than within them, it is unsafe to extrapolate and say that the differences in cancer between groups are also likely to be due chiefly to environmental differences. To see whether these differences have in fact a large genetic component would require study of individuals from each group, as well as hybrids between them, and from later generations, all under similar environmental conditions. Such studies are perhaps possible in a place such as Hawaii, but they still lie in the future.

Historically, to the medical man, the effect of environment was interesting because he could do something about it, but the effects of heredity were less interesting because it was impossible to change a person's heredity except to the limited extent that could be done by marriage counseling. Suppose, however, as indicated in the preceding papers, that a deficiency of vitamin B_1 in the diet leads frequently to liver cancer in Filipinos and stomach cancer in Japanese or, again, suppose that the drinking of hot tea leads to stomach cancer in the Japanese and to cancer of the nasopharynx in Chinese. In each case both organ systems are exposed to the same environmental factor, and it is quite likely to be the hereditary endowment or constitution of the individual involved that decides which system will respond with cancers. Within any one genetic type some environmental factor is the proximate cause of the disease. If a study of the environmental factor is desired, homogeneous genetical material must be obtained, or important environmental factors may be missed. The other side of the coin, which until now has not been given adequate attention by the medical profession, is that treatment effective for a particular disease on one genetical background or in one ethnic group may not be equally effective in another. Only when genetically homogeneous material is considered is the study of the beneficial nature of certain environmental changes valid. Furthermore there have been cases in which genetic studies have shown that apparently identical diseases actually were different, and these studies have enabled slight differences in the symptoms to be recognized. Thus the prospects of medical treatment have been improved.

I turn now to specific comments on the preceding papers. It should be recalled, however, that it is the nature of such comments that one specifies when he disagrees with an author but fails to mention the more numerous times when he agrees; in no case are my comments to be taken as criticism of any particular author.

I have already mentioned the very interesting paper of J. May and have nothing more to add to my comments.

Turning to W. B. Quisenberry's paper: it has already been mentioned that apparently similar environmental factors may lead to cancer of different sites in Filipino, Japanese, and Chinese people. Quisenberry mentioned the higher rate of cancer of the nasopharynx in South China, where most Hawaiian Chinese come from, than in the North. This may be due in part to different cultural traits, but it should also be remembered that Northern Chinese differ from Southern Chinese in a great many genetical characteristics, including even those governing their strikingly different physical appearance. These genetical differences may very likely be involved in the difference of the cancer incidence.

I quote one passage from the advance abstract of S. Graham's paper, not in criticism of him but as an example of the thinking into which the non-geneticist is prone to fall. He said: "Our studies show large differences in the presence of cancer of the esophagus and large intestine among Polish and Italian-Americans. Further study of these groups should be undertaken to discover the dietary or other trait which accounts for these differences." While "other trait" might include genetical traits, in Graham's context these would ordinarily be thought of as environmental. It is of course quite possible that the only differences that are relevant in this case are genetical and that there are no important environmental traits causing the difference. At a more technical level, Graham's discussion of circumcision as affecting cancer of the cervix must distinguish between Jewish and non-Jewish persons studied, since any genetical difference in susceptibiltiy to cancer of the cervix between Jews and non-Jews would introduce a spurious correlation between cancer of the cervix and circumcision.

With respect to D. M. Spain's paper: he has referred to a number of the difficulties in interpreting such data. I shall remark on one more, namely that the early studies are primarily designed to detect cases of coronary artery disease, while the later investigation was a deliberate study of atherosclerosis. Consequently the two studies are not completely comparable.

With regard to the paper presented by D. M. Berkson: he pointed out the difficulty of comparing the different groups discussed because of differences in age with the obvious effect on the condition studied. It may be pointed out that it is quite feasible by standard statistical techniques to adjust the data for age. While this does not solve all problems, it would greatly increase the comparability of the different groups. Finally it may be mentioned that there were very few Negroes employed by the utility company cited; as a result the number of individuals in the Negro classes in the utility was too small a group for making satisfactory comparisons with the whites (for example, the incidence of definite coronary disease is based on 4 cases, and suspect coronary disease on 12 cases).

Part II. Sociocultural Factors in Mental Illness and in Public Health Programs

CROSSCULTURAL INQUIRY INTO THE SYMPTOMATOLOGY OF SCHIZOPHRENIA

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During the last five years my co-workers and I have been engaged in studies concerning the relationship between the nature, prevalence, and incidence of mental illness and cultural environment. To emphasize that our studies go beyond the boundaries of any one culture and, indeed, focus on differences observed in many cultures, we have labeled our activities *transcultural*, whereas we have applied the term *crosscultural* to their comparative aspects.

In the course of this work we have established contact with a large number of psychiatrists and social scientists in numerous countries. The material obtained from them has been fed back to them, and has been made available to others, by means of our *Transcultural Psychiatric Review and Newsletter*, which is published biannually.

Having established a network of correspondents that virtually spans the whole world, it then became possible to use this network for research purposes. Our first pilot project undertaken in this way, on which we are going to report, concerns a crosscultural survey of schizophrenic symptomatology. Schizophrenia was chosen as the subject of our study because: (1) it is the most important psychiatric concept, and (2) its universal existence is generally accepted.

Difficulties and Potential Sources of Error

Needless to say, even at the outset we were fully aware of the complexity of our task, of the shortcomings of a mailed questionnaire as a research tool, and of the numerous sources of error and potential fallacies that we should have to face. For example as regards comparability it had to be taken into account that the reporting psychiatrists are from different cultures; that their training, clinical concepts, and working conditions vary; that their understanding of the peoples among whom they work varies; and that the attitudes toward and concepts of mental illness of members of different cultures are subject to variations.

Method and Material

As previously mentioned, the tool of our research was a mailed questionnaire to the design of which much thought was given. For example it was obviously necessary to design it in such a manner as not to make it too time-consuming for busy practitioners. Nor could it be presupposed that our respondents were familiar with anthropological terminology or theory; yet it was hoped that the information obtained would be sufficient to develop heuristic hypotheses that afterward could be tested.

The areas covered by the questionnaire comprised observed schizophrenic symptomatology, clinical subtypes, cultures and peoples to whom the observations referred, and locale of observation and psychiatric orientation of the observer. For the reasons given, no absolute quantification or a comparison with other forms of mental disorder was attempted. Instead respondents were requested to score estimated frequency on a five-point scale, ranging from "very frequent" to "very infrequent." Completed questionnaires on 87 patient samples or "cultures" were received from 37 respondents in 25 countries.

The countries from which information was obtained are presented in TABLE 1. The patient samples or "cultures" were often not strictly those that a cultural anthropologist would call cultural entities, but they were obviously distinct enough to be regarded by the reporting psychiatrists as separate entities with distinguishable sociocultural features. In over 20 instances several psychiatrists reported separately on observations made in the same or in similar cultures. These instances are of special interest because they enabled us, up to a point, to test agreement or disagreement of observations and, in the case of agreement, to draw supported inferences regarding the relationship between culture and schizophrenic symptomatology.

TABLE 1
SOURCES OF DATA*

Africa	Kenya Union of South Africa	Nigeria	Uganda
Asia	Formosa Japan (Okinawa)	Hong Kong Korea (South)	India Thailand
Australasia	Australia	New Zealand	
Europe	Bulgaria	Czechoslovakia	Norway
Middle East	Kuwait	Turkey	
North America	Canada	United States	
South America and Caribbean islands	Barbados Ecuador	Brazil Martinique	Colombia Peru

* Patient samples, 87; respondents, 37; countries, 25.

Results

Diagnosis. TABLE 2A gives the list of schizophrenic symptoms that our respondents were asked to score in relation to the cultural groups under their observations.

A global view shows that psychiatrists all over the world (with very few exceptions that require exploration and explanation) regard *social and emotional withdrawal*, *hallucinations* and *delusions*, and *flatness of affect* as typical schizophrenic symptoms. There is also a consensus that auditory hallucinations are more frequent than visual ones and that olfactory and tactile hallucinations are uncommon (TABLE 2B).

However, in contrast to our own clinical experience and that of psychiatrists in many other countries, infrequency of *inappropriateness of affect* has been reported from 15 "cultures," infrequency of *hypochondriacal ideas* from 18 "cultures," and infrequency of *depersonalization* from 36 "cultures." The question here seems to be to what extent these divergencies are due to application of different diagnostic criteria, as is probably the case with depersonalization, or are due to differing settings of observation, or are due to actual differences in cultural background. Regarding echolalia and echopraxia, which belong to the classical descriptions of schizophrenia but have almost disappeared in our own experience, it is interesting to note that they are still reported "frequent" from one hospital and "common" from several others.

TABLE 2A
LIST OF SYMPTOMS

Delusions
- (a) Grandeur
- (b) Jealousy
- (c) Persecution
- (d) Religion
- (e) World destruction or redemption

Hallucinations
- (a) Auditory
- (b) Visual
- (c) Olfactory
- (d) Tactile

Hypochondriacal ideas

Catatonic states
- (a) Stereotypy
- (b) Mannerisms
- (c) Negativism
- (d) Stupor
- (e) Automatic obedience
- (f) Echolalia
- (g) Echopraxia
- (h) Rigidity
- (i) Excitement

Social and emotional withdrawal

Loss of control
- (a) Of bladder
- (b) Of bowel
- (c) In masturbation
- (d) In temper outburst
- (e) In sexual assault
- (f) Homicidal
- (g) Suicidal

Disturbances of affect
- (a) Flatness
- (b) Inappropriateness

Depersonalization or derealization

TABLE 2B
MODE OF RATING SYMPTOMS

Hallucinations	5	4	3	2	1
	Very frequent	Frequent	Common	Infrequent	Very frequent
Auditory	✓				
Visual		✓			

Bowel and bladder incontinence have declined more consistently, probably as a result of changes in the nature and intensity of patient care.

Setting of observation. TABLE 3 shows that the majority of our respondents saw patients in more than one type of setting and hence presumably did not have their picture of schizophrenia distorted by seeing patients either predominantly in advanced or deteriorated stages or in early stages.

Some differences are noticeable. Psychiatrists seeing patients only outside of mental hospitals reported, contrary to expectation, a higher frequency of the hebephrenic subform and lower frequency of the simple subform than their colleagues. Also unexpectedly, psychiatrists working only in mental hospitals tended to report a lower frequency of emotional withdrawal, that is, of autism, than that in other reports. These differences are statistically significant.

As mentioned previously it would be expected that variations in presented symptomatology in different mental hospitals, in so far as regressive phenomena are concerned, are less likely to be observed in a hospital with an active treatment program than in another that is understaffed, overcrowded, and predominantly concerned with its custodial function. This is a crosscultural variable that we could not explore with our questionnaire.

Certainly sets of observations by respondents concerning identified but nonhospitalized schizophrenics and their symptomatology in the family or community setting would be of the utmost interest and value to this study, but for obvious reasons are not available.

Differences in conceptual boundaries. Another factor that had to be taken into account both in designing our questionnaire and in evaluation of our findings was the known differences among psychiatrists (within the same culture and even more so on comparison of different cultures) as to the boundaries of the concept of schizophrenia. Deliberately we did not inquire specifically into adherence to any particular school because we thought that there might be a gap between nominal allegiance and daily practice. Instead we asked our respondents whether they included in their concept of schizophrenia patients without disturbance of perception, with marked affective disturbances, with psychotic episodes of short duration, and with much confusion and slight organic-type symptoms.

TABLE 3
SETTING OF OBSERVATION

(1) Distribution of "cultures" by setting of observation		
Mental hospital	Patients at time of admission	33
	Patients on wards	33
	Outpatients at clinics	27
General hospital	Patients on wards	21
	Outpatients at clinics	18
Private practice		19

(2) Distribution of respondents by setting	
(*A*) Working both *inside* and *outside* mental hospitals	26
(*B*) Working *inside* mental hospitals only	6
(*C*) Working *outside* mental hospitals only	6

We had hoped in this way to divide our respondents into those who adopt the Kraepelinian viewpoint and those who adopt the wider Bleulerian viewpoint. As TABLE 4 shows, this proved impossible. Rather unexpectedly we found that, by and large, psychiatrists all over the world, irrespective of known prevailing teaching orientation, adopt a rather wide view of the concept of schizophrenia.

However, as can be shown, constriction or extension of the concept of schizophrenia significantly influences the material reported upon. For instance psychiatrists who insist on disturbances of perception as essential for their diagnosis of schizophrenia, that is, adherents of the Kraepelinian viewpoint, seldom diagnose schizophrenia simplex—a subform added by Bleuler—but they report catatonic states as infrequent also, which is much more difficult to explain. Inclusion or exclusion of confusional (amentia) states corresponds with the frequency with which hebephrenia is reported. Thus a high frequency of the diagnosis hebephrenia in cultures in which psychiatrists exclude confusional states contrasts with a low frequency in cultures in which confusional states are included.

Cultural groupings. As mentioned earlier we have a number of reports from different sources in which the groups reported on can for the purposes of our analysis be categorized as of the same broad culture type or at least as sharing certain major cultural characteristics. For example we have a report on a Japanese population in Brazil as well as three reports from different parts of Japan itself, and we feel justified in treating these as belonging together however much a Japanese anthropologist might be able to recognize regiona differences. One of our analytic procedures was to set up six major culture-blocks for special study, thereby making it possible to ask whether the modal schizophrenia pictures reported by different psychiatrists for patients within the grouping substantially agree or agree no better than chance. TABLE 5 shows the results.

TABLE 4
BORDERLINE DIAGNOSTIC CRITERIA

The questions	Number of respondents answering	
	Yes	No
In making a diagnosis of schizophrenia, do you include patients:		
(*A*) *Without* hallucinations and delusions?*	32	6
(*B*) *With* marked affective (that is, emotional) disturbances?*	32	6
(*C*) Whose psychotic episode (or episodes) is of *short duration*?	33	5
(*D*) *With* much confusion and slight organic-type symptoms for which no organic cause can be found?	15	23

* The six respondents answering NO on *A* are not the same people as the six answering NO on *B*.

We decided to regard a difference of no more than two steps in our five-point scale as indicating substantial agreement. Conversely we decided to regard a straddle of four or five steps in the five-point scale as indicating substantial disagreement. The likelihood of such "agreement" or "disagreement" occurring by chance can be calculated for any given combination of observers and items being scored; the "expected" columns of TABLE 5 show what these chance expectations were.

In all cases the psychiatrists agreed substantially better than if they had scored purely at random and disagreed considerably less frequently than expected if they had been scoring at random. The real question, however, is whether these different groups of psychiatrists could agree on particular items that tended to differentiate one culture (or batch of culturally similar patient samples) from another. It means virtually nothing if all the psychiatrists reporting on Japanese groups state that tactile hallucinations are very infrequent and delusions of persecution are frequent, for we have seen that these are agreed to be characteristic of all schizophrenics anywhere.

When tested in this fashion the results are not so good. For each of the six cultural groupings there appears only one or, at most, two items of our 30 that all the psychiatrists observing this culture agree on and that are scored differently for the other five cultural groupings. Thus catatonic stereotypy appears to be relatively frequent among the Japanese, whereas it is relatively infrequent in the other five groupings. Catatonic excitement and catatonic rigidity are relatively frequent in all the Indian groups of patients reported on, whereas they are quite infrequent in all the Euro-American. Of the six groupings now being discussed, delusions of a religious nature are agreed to be frequent only in the overseas British; on the other hand, this group is agreed to have an unusually low level of stereotypy and rigidity.

TABLE 5

FREQUENCY OF "AGREEMENT" AND OF "DISAGREEMENT" OBSERVED BETWEEN PSYCHIATRISTS REPORTING ON PATIENT SAMPLES DRAWN FROM THE SAME OR SIMILAR CULTURES AS COMPARED WITH THE FREQUENCIES EXPECTED BY CHANCE

Culture	Number of psychiatrists reporting	For 30 items			
		Agreement		Disagreement	
		Observed	Expected	Observed	Expected
Japanese	(4 reports)	14	2	5	14
East Indian	(5 reports)	8	2	3	19
Jewish	(4 reports)	12	2	3	14
British overseas	(6 reports)	7	1	10	24
	(5 out of the 6 reports)	10	2	6	19
"Old United States"	(3 reports)	20	4	5	9
West European immigrant	(3 reports)	15	4	2	9

The point at this stage, however, is not what distinguishing items psychiatrists can agree on but the fact that these items are so few and relatively unimportant. However, this finding may not be as serious as it appears to be. Such results refer only to items on which all the observers concerned were in substantial agreement. The presence of a single observer with an idiosyncratic viewpoint could clearly defeat any attempt to get an agreed version of a modal pattern, although such modal pattern existed and was agreed to by a majority of the observers. When we cease to demand such full agreement and look only at broader categories of culture, then further results do appear. Possibly this may prove to be true even for smaller cultural groupings once we solve the problems of deciding how to form such entities and of allowing for the different diagnostic viewpoints, but we have not yet reached that stage. The areas thus far worked out concern subforms, disturbances of perception, and disturbances of affect.

Paranoid schizophrenia appears to be fairly frequent everywhere, but the other three main types do show variation with broad cultural grouping. As may be seen from TABLE 6 Euro-American peoples seem to present the catatonic and hebephrenic forms of schizophrenia notably less frequently than do other peoples. Regarding the catatonic form, there is some question whether this observation is linked to special cultural factors or simply to better developed psychiatric services wherever they may occur. This argument does not apply to the simple and hebephrenic forms where there appears to be a genuine association between certain types of culture and the predominance of those types of schizophrenia.

TABLE 6

REPORTED FREQUENCY OF THREE MAIN TYPES OF SCHIZOPHRENIA IN DIFFERENT CULTURAL GROUPINGS

	Catatonic-type schizophrenia	
	Very frequent or frequent	Very infrequent or infrequent
Euro-American groups	3	16
Other groups	14	11
	Schizophrenia simplex	
	Very frequent or frequent	Very infrequent or infrequent
Asian groups	11	1
Other groups	6	13
	Hebephrenia	
	Very frequent or frequent	Very infrequent
Japanese and Okinawans	4	0
Euro-Americans	4	10
Other groups	4	4

TABLE 7 shows the more clear-cut differences regarding types of delusion. As shown there would appear to be a marked difference in the appearance of delusions of destruction and religious delusions between Christian groups and those following the major Asian religions, with Moslem groups falling somewhere in between.

The broad difference between Euro-Americans and Asians that dominates the data on hallucinations in TABLES 6 and 7 disappears, and a new feature appears. Auditory hallucinations, of course, predominate almost everywhere, but in the Arabian and African groups on which we have reports visual hallucinations challenge this dominance, and tactile hallucinations, elsewhere unimportant, gain a relative importance also (TABLE 8). Since the same phenomenon is not reported for groups such as the Formosan aborigines and South American Indians, the obvious hypotheses relating to verbal communication and the muffling of the tactile senses with clothes would seem to be inapplicable. The combining of data from Arabian and African cultural groups, as we have done here, does not make much sense to the anthropologist, but the finding does nevertheless seem to be more than accidental.

Disturbances of affect individually do not appear to be associated with any one group of cultures rather than another, but a minor point of interest arises when we consider the relative frequency of flatness and inappropriateness. In most cultures flatness of affect is marked as more frequent than inappropriateness, but in six of the eight Moslem groups that we have reports on, the reverse is found, inappropriateness being apparently more striking than flatness. Catatonic manifestations, as one would expect from what was said about the catatonic type of schizophrenia, are least common in the Euro-American groups, but the distribution of the various types of catatonic behavior varies somewhat. Negativism, rigidity, and mannerisms all tend to be especially frequent in East Indians, whereas automatic obedience, stereotypy, echolalia, and echopraxia are not. Stereotypy appears particularly infrequent in North American peoples, 9 of the 14 cultures reported as "very infrequent" on this item being from North America while 3 others were from Australia and New Zealand.

TABLE 7

REPORTED FREQUENCIES OF THREE TYPES OF DELUSION IN SCHIZOPHRENICS FROM DIFFERENT CULTURAL GROUPINGS

	Delusions of destruction			
	Frequent	Very infrequent		
Predominantly Christian	9	1		
Predominantly non-Christian	5	13		
	(No "very frequents" reported)			
	Jealousy delusions			
	Frequent	Very infrequent		
Asian groups	7	0		
Other groups	1	3		
	Religious delusions			
	Very frequent	Frequent	Infrequent	Very infrequent
Christian groups	5	8	6	0
Moslem groups	0	5	1	1
Hindu, Buddhist, Taoist, and Shintoist	0	2	8	5

Homicidal trends in schizophrenia are reported as most common among Africans, and suicidal traits among the Japanese, but in both these instances common sense suggests that the association may be with Africans and Japanese in general rather than with Africans and Japanese suffering from schizophrenia. Loss of bowel and bladder control are not frequent anywhere, but appear to be particularly infrequent among the Chinese and among most South American peoples. Hypochondriacal ideas are reported most frequently for Near-Eastern peoples; some continental European groups follow, but hypochondriacal ideas are not notably infrequent anywhere.

Summary and Conclusions

(1) As we set out to study differences in schizophrenic symptomatology, we found, as we had expected, a major barrier for transcultural comparison arising from differences in clinical concepts of schizophrenia.

(2) Another handicap of the study was the near total reliance on hospitalized patients in the sample; the community setting was neglected. A different picture may conceivably emerge if patients retained in the family and community settings are studied.

TABLE 8

REPORTED FREQUENCIES OF TWO TYPES OF HALLUCINATION IN SCHIZOPHRENICS FROM DIFFERENT CULTURAL GROUPINGS

	Visual hallucinations	
	Very frequent or frequent	Very infrequent or infrequent
Arabian and African groups	6	1
Other groups	17	33
	Tactile hallucinations	
	Frequent or common	**Very infrequent**
Arabian and African groups	5	0
Other groups	5	49

(3) Although most of the reporting psychiatrists are handicapped by lack of training in social science and although it is clear that the most fruitful studies will necessitate collaboration between the two disciplines, this pilot study suggests that the approach we have used can yield positive results.

(4) The most significant results from the material thus far analyzed are: the rarity of religious delusions and delusions of destruction in non-Christian samples; the high frequency of schizophrenia simplex in Asian groups; the relative frequency of visual and tactile hallucinations in Arabic and African samples; and the selective nature of catatonic states among the peoples of India.

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CULTURAL STRESSES AND SCHIZOPHRENOGENESIS IN THE MOTHERING-ONE IN PUERTO RICO

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It is our aim in this paper to describe certain biological, psychological, and sociological phenomena in the mathematical metalanguage of propositional calculus and of the algebra of classes, as well as to propose certain definitions and relational axioms that will make it possible to formulate the dynamics of the interaction of such phenomena with the clarity and precision made possible by mathematically structured statements.

Today it is no longer novel to remark that the behavioral sciences are handicapped by their atomization: that is, by the fact that such fields as psychiatry, medicine, anthropology, sociology, and experimental psychology have each established a separate realm within the universe of discourse, with special definitions, vocabulary, methodological orthodoxy, and implicit collective representations. The same atomization characterized the physical sciences at the turn of the century. However, "The instrument of mathematical logic, which has begun to be appreciated during the present century,"[1] has helped to bring about the unity of the physical or natural sciences.[2]

Mathematical logic has made possible not only a unity of language in science, but has also provided the necessary preliminary condition for a unity of scientific laws.[3] Thus theorems of, for example, physics and chemistry can be so formulated that a hypothesis explanatory of biological phenomena can be derived from them without the naïve reduction of the subject matter of one science to that of another. Partly as a consequence of the new methodological emphasis on formal analysis, natural science has acquired more knowledge within the last 50 years than during the previous 50 centuries.

On the other hand the behavioral and social sciences are only beginning to avail themselves of the same intellectual instruments, although ". . .Many significant areas of these disciplines have already been removed by the advances of the past two decades beyond the reach of anyone who does not know mathematics."[4] However, still burdened by the 19th century notion that mathematical formulations necessarily reduce all principles to material causes[5] and to mechanistic explanations,[6] many sociologists, anthropologists, and psychiatrists have communicated only with other sociologists, anthropologists, or psychiatrists in more or less personal modifications of the "thing language" of everyday discourse. Many of the attempts at interdisciplinary communication have failed to surmount the ambiguities of the vernacular and the equivocations consequent to the intradisciplinary connotations of the metaphors, hidden assumptions, or semantic distortions implicit in everyday language.

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[1] Bertrand Russell, "On the Importance of Logical Form," *International Encyclopaedia of Unified Science* (University of Chicago Press: Chicago, Ill., 1955 ed.), Vol. I, p. 39.

[2] Cf., Bertrand Russell: "The importance of logical form may be illustrated by what may be called the principle of the dictionary: Given two sets of propositions such that, by a suitable dictionary, any proposition of either set can be translated into a proposition of the other set, there is no effective difference between the two sets. Suppose—to take a hypothesis that I neither affirm nor deny—that all scientific propositions can be tested in terms of physics and can also be stated on Berkeleian principles, in terms of psychology; then the question as to which of these forms of statement is the more correct has no meaning, since both or neither must be correct. Such dictionaries, which can, as a rule, only be constructed by the help of modern logic, suffice to dispose of large numbers of metaphysical questions, and thus facilitate concentration upon genuine scientific problems" (*ibid.*, p. 41).

[3] Rudolf Carnap, "The Logical Foundations of the Unity of Science," *International Encyclopaedia of Unified Science* Vol. I, p. 61 ff.

[4] Abraham Kaplan, "Sociology Learns the Language of Mathematics," *The World of Mathematics*, ed. by James R. Newman (Simon and Schuster: New York, 1956), Vol. II, p. 1294.

We shall attempt to enunciate some basic, no doubt familiar, psychiatric and psychoanalytic concepts in the universal symbolic scheme of mathematical forms. Once the process of logical reformulation has been started, even if the initial attempts are clumsy, other psychiatric, psychological, or anthropological concepts may be similarly expressed. The logical analysis of these concepts may then permit the explication of basic axioms and theorems of psychiatry in a manner intelligible to nonpsychiatrists. Perhaps then the accusation frequently made that these disciplines, particularly dynamic psychiatry and psychoanalysis, contain more sacred doctrine than scientific knowledge can be answered.

The concepts implicit in the premises of this paper were first empirically explored and defined by Sigmund Freud, Harry Stack Sullivan, and Frieda Fromm-Reichmann. No attempt is made here to prove the correctness or incorrectness of any of these concepts or to demonstrate that the approach to psychiatric phenomena that they imply is "true" rather than "false." In discussing "Science and Hypothesis," Henri Poincaré observed that: "Certain hypotheses are valuable because by experiment they can be verified or refuted. But there is another important class of hypotheses which, though they can neither be confirmed nor disproved, are yet indispensable to science because (in the words of Josiah Royce) they are 'devices of the understanding whereby we give conceptual unity and an invisible connectedness to certain types of phenomenal facts which come to us in a discrete form and in a confused variety.'"[7] Such concepts, therefore, as the "anaclitic relationship" between the infant and the "mothering-one," and "schizophrenogenesis" are neither verified nor refuted here. The specific cultural stresses, operative in Puerto Rico, represent one type of phenomenal fact and are utilized in this paper by way of illustrating "the devices of the understanding" provided by these concepts. The topological and algebraic formulations that follow are meant to provide the "conceptual unity" and the "invisible connectedness" between these facts and premises.[8]

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[5] Abraham Kaplan pointed out that many social scientists confuse the specific techniques of applying one type of mathematical method to a special empirical science with the method of logistic inference in general. "The confusion of method and technique and the resultant identification of scientific method with the techniques of physics (and primarily 19th-century physics at that) has hindered the advance of the social sciences not a little. For the problems of sociology *are* different from those of physics . . . Yet none of those differences . . . prevents a scientific study of man. That social phenomena are complex means only that techniques must be developed of corresponding complexity . . . And the allegedly "qualitative" character of social facts is, after all, only an allegation; such facts have their quantitative aspects too. And what is perhaps more to the point, mathematics can also deal with qualitative characteristics . . ." (Abraham Kaplan, *op. cit.*, p. 1299 ff.)

[6] Mathematicians have explained that mathematical work is not simply mechanical, but demands the creative combination of aesthetically selected judgements. Mechanics is merely a question of applying rules in making the most combinations possible according to fixed law. Every mechanistic system can be mathematically translated into an indeterminate number of equally correct mechanistic systems (see Henri Poincaré, "On Mathematical Creation," *The World of Mathematics*, Vol. IV, p. 2046 ff.).

[7] Henri Poincaré, *The Foundations of Science*, cited by James R. Newman, *The World of Mathematics*, Vol. II, p. 1378.

I. *The Organization of the Ego: the Isomorphic Subsets*

We shall define the ego, operationally, as a universal set to which all functions of ***human*** behavior pertain. Three subsets of ego functions belong to the universal set. We shall call them: (1) the (S) or *somatic* subset of the ego, (2) the (A) or *affective* subset of the ego, and (3) the (N) or *noetic* subset of the ego.

Every activity of the ego can be identified as a function of behavior, covert or overt, that pertains to one of these subsets in a primary[9] sense. The elements of these subsets are processes, not material entities. References to the topological structure and transformative functions of these subsets imply nothing about their material structures or mechanisms; they merely describe the symbolic scheme of their logical organization.

The subsets and their respective functional elements that are transformed (by a process later defined) into functions of the ego are defined topologically as follows:

The (S) *or somatic subset.* The functions of (S) are determined by the evolution of life and the philogenesis of *Homo sapiens*. Life evolved through a continual repetition of trial and error. As errors were continually eliminated, the variations in the performance of a trial, that is, a specific trial relative to a specific but constant environmental condition, diminished until the statistical range of possibilities was bound within limits that established the minimal conditions of survival. Whenever one performance was mastered by the species, that is, when fatal errors were precluded, the energy formerly spent in mastering the contingent environmental condition could now be utilized safely in the exploration of a new type of performance. Thus a higher level of interaction developed, culminating in the construction of new adaptive mechanisms. The physiochemical organization of the genes (that is, of the interlocking chains of amino-acid sequences in reproductive cells that "administrate" the construction of structurally equivalent cells) of any species schematizes the structural transformation of the experienced sequence of learned, that is, mastered and therefore no longer trial-and-error, behavior. As a result, the growth of the individual from fertilized ovum to mature organism recapitulates with fantastic speed the necessary structural transformations that mark the path of evolution from the first "amoeba" to *Homo sapiens*. The "knowledge" accumulatively inherited from the history of the species directs the organization[10] of the embryo. This process, particularly in the beginning, requires abundant energy. The embryo takes from the mother's body this energy through the placenta in an immediately usable form. Since the embryo selects and takes both qualitatively and quantitatively exactly what it needs at the moment, the environment of the womb is absolutely benevolent. Hence the embryo expends only a minimal amount of its vital energy in adjusting *itself* to this environment. As the biological entity, the organism, is gradually structured, (S) functions are topologically bound to operate benevolently—relative to the whole organism—within the inherited perimeter. The somatic functions of *Homo sapiens* can therefore be described and measured in terms of such factors as the biologically benevolent or successful range of blood pressure, basal metabolism, and body temperature.

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[8] Cf., Abraham Kaplan: "Mathematics, if it has a function at all in the sciences, has an indispensable one; and now that so much of man's relation to man has come to be treated in mathematical terms, it is impossible to ignore or escape the new language any longer . . . Geometry, algebra, statistics, and topology use distinct concepts and methods and are applicable to characteristically different sorts of problems. The role of mathematics in the new social science cannot be discussed in a general way: everything depends on the ***kind*** of mathematics being used . . . It is paradoxical that the field of mathematics which deals with the most familiar subject-matter is the least familiar to the non-mathematician. A smattering of geometry, algebra, and statistics is very widespread; topology is virtually unknown, even among social scientists sympathetic to mathematics" (Abraham Kaplan, *op. cit.*, p. 1294 and p. 1306).

[9] The connotation of "primary" as used here is mathematical rather than psychological. A "primary" function cannot be factored or reduced to a different function or combination of functions.

The (A) *or affective subset.* The functions of (A) are determined analogously to those of (S). At birth, the first moment of individual existence, a new type of trial-and-error learning initiates the interaction between the infant and his physically separated environment. Since the infant's needs are no longer satisfied automatically by genetically controlled sequences of placental exchange, the new environment is no longer conditioned to be necessarily and constantly benevolent. Therefore a new system of instruments of adaptation and control evolve: the instruments of affect.[11]

In the human being, affect signals the momentary quality of the interpersonal environment as it varies within the range of a benevolence-hostility continuum.[12] Anxiety signals danger and thereby indicates the radically new experience of hostility.[13] The functions established by trial and error that succeed in allaying anxiety and those that succeed in increasing the instances of benevolent interaction are transformed into the (A) subset of the ego.

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[10] The etymology of the term "organization" clarifies the process so labeled. The words organ, organization, and organism, and others are derived from *ergon* (to work). This derivation suggests that structure is the spacial equivalent of the temporal concept of work or energy. That is, the biological process of organization is the creation of an instrument, or, in other words, the transformation of the energy "lost" or dissipated in the physical processes of the temporal universe into a spacial concentration or structure, which, although it expends energy in its life processes, becomes more efficient with each evolutionary cycle. The ratio between the free or "wasted" expenditure of energy and the bound utilization of energy in the construction of "booster" and "transformer" instruments continually shifts toward greater and greater economy, so that entropy is slowed down and evolution is speeded up. Ontologically (if further indulgence in speculation be permitted in a footnote) the universal process of life can be described as the concentration or condensation of *time past* (that is, free energy) into *time present* (that is, space). This process expells *time future* as a "waste product," so to speak, thereby creating the antiprocess of again dissolving space into time. The ever-increasing efficiency of the process increases the amount of the created future time, which, in turn, condenses again into a structurally more complex space, and the cycle continues. We live, therefore, in an alternately time-expanding-space-contracting and time-contracting-space-expanding universe.

[11] The term affect is derived from the combination of *facere, fact-* (L. for to make or to do) and *fingere, fict-* (L. for to shape, fashion, or mold, and hence to make up, as a "fiction"). The prefix *ad* gives the making-up or doing a direction. Hence it can be described as a vector, that is, as a product of length or quantity, direction, and sense or quality. Thus "to affect" came to mean "to influence," or "to act upon," as well as, passively, "to be influenced" or "acted upon:" to be that which contained the shaped or molded "fiction."

[12] The interaction with the environment is experienced as a co-ordinate of two factors: satisfaction and security. An experience of satisfaction indicates that the needs of the organism are fulfilled and that, at the moment, no further expenditure of energy is required. Since

The (N) *or noetic subset.* The human being is unique among the living organisms of our planet in being able to use a third group of functions in addition to somatic and affective ones in interaction with his environment. These noetic functions are still, at the present stage of human evolution, unstable relative to somatic functions, and they are highly variable from one individual to another as well as from one moment to another in the history of the same individual. The description of the elements of *nous*[14] (that is, of man's rational mind) is immensely complicated and represents a task beyond the scope of this paper. We propose, however, as a thesis for further elaboration that noetic activity is a form of play, made possible by the accumulation of stored energy that is not required for somatic or affective trial-and-error efforts. The somatic energy consumption in the human being has been stabilized during eons of organic evolution at a high level of efficiency. Affective energy consumption is radically variable from one individual to another, according to the specific qualities of individual heredity and the interpersonal environment during the psychosexual development. Ideally the socially established familial environment is sufficiently benevolent throughout a long period of time to permit the accumulation of enough energy for the maximum growth of noetic structures, relative to the individual's inherited capacity.

The algebra of ego functions. Although the designation of (S), (A), and (N) subsets of the ego establishes criteria for the topological grouping of human behavior, two theorems are required to explain the operations whereby the topological subsets are transformed into algebraic subsets;[15] that is, to define

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anxiety signals "danger" the organism must "call to arms" as it were, the maximum energy in order to escape from or eliminate the danger. Successful escape is experienced as security; but this security may be obtained only at the expense of immediate or complete satisfaction. The technique of dealing with anxiety, learned by trial and error, shapes the process of acculturation.

[13] Just as pain may be operationally defined as an instrument of signaling physical injury: that is, the threat of disorganization of (S) functions; so anxiety may be said to be an instrument of signaling the loss of security in an interpersonal interaction; that is, anxiety indicates a threat of disorganization of (A) functions.

[14] Aristotle used the term *nous* (νοῦς) to refer to the act of intellectual, as distinct from sensible, apprehension. *Nous* denotes the capacity to formulate theories: conceptual entities which come first in the order of reasoning, that is, of constructing mathematical systems of pure symbolic relations; but which come last in the empirical order from which the conceptual entities are derived by continually repeated abstraction, thus becoming ever more essential: that is, ideal or concentrated. Aristotle distinguished between the analytic intellect (*nous pathetikos*), which reflects conceptual images of the sensibly experienced world, and the synthetic or constructive intellect (*nous poietikos*), which creates the intelligible universe or the world of ideas. While Aristotelian metaphysics and cosmogeny are fundamentally alien to the frame of reference of this essay, the dynamism implicit in the Aristotelian description of *nous* makes it useful in defining noetic functions parallel to somatic and affective functions (see Aristotle, *De Anima*, Bk. III, 429a ff.).

[15] An "algebraic" set consists of a group of elements that are ordered by the application of operations that are elements pertaining to another set, when these operations are themselves functionally related to each other. For example, the progressive transformations of the spacial relations between chess figures on a chess board, from the beginning to the end of a game, make up the elements of an algebraic set. The structure of the chess board is the *field* or *dominion* of the game; the spaces occupied by the chess figures are the elements of the *topological* set; the rules of the game are the elements of the *operational* set. These rules de-

the mode of the relations that organize the (*S*), (*A*), and (*N*) functions into systems of correlative vectors. We shall call the relations whereby the ego is organized *ego transformations*,[16] and the relations whereby the organized, or transformed, ego interacts with the interpersonal environment *ego operations*.[17]

Theorem (1) is: *The subsets of* (*S*), (*A*), *and* (*N*) *must be isomorphically organized in order to form the ego.*

Theorem (2) is: *The isomorphism is constructed by vectors of* (*S*), (*A*), *and* (*N*) *functions that relate one function of each subset to one and only one function of each of the other two subsets in continuous biunivocal correspondence.*

In this manner the functional variables of somatic, affective, and noetic behavior become bound as equivalent elements of what is now transformed into three subsets of the ego. The elements of interaction with the interpersonal environment are now organized as self-consistent ego operations.

Hermann Weyl defines isomorphism as "the connection between a given continuum and its symbolic scheme."[18] Other mathematicians have defined this relationship as the correspondence between an object and its reflection or shadow: a one-to-one equivalence of every element of the object with every element of the shadow, topologically or operationally. While object and shadow are equivalent, they are not identical. Identity would destroy the

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termine the *vectors* of the chess figures: the products of the direction and range of mobility of each chess figure. As the rules are placed into operation, they reveal the temporal-spatial, and thus topological relation between any two figures at any moment. The manner in which the relocation of one chess figure changes the value of another determines the *functional* relation between them. The operations of the game are *applications upon* the topological set, which now becomes an algebraic set undergoing continual transformations as the game progresses. Each operation, such as moving a pawn forward, involves the *pairing* of two elements: the former position of the pawn is paired with the new position of the pawn. The vector *realized temporally* by a specific move is the product of the direction, distance, and quality (that is, offensive or defensive) of the move. This illustration may help to clarify the meaning of these mathematical terms. For a detailed exposition of the theory of sets see Hermann Weyl, "The Mathematical Way of Thinking," *The World of Mathematics*, Vol. III, p. 1832 ff., as well as *Mind and Nature* and *Philosophy of Mathematics and Natural Science* by the same author; see also Max Black, *The Nature of Mathematics*, especially "The Theory of Sets" (Littlefield, Adams & Company: Paterson, N.J., 1959), p. 179 ff.

[16] A *relation*, mathematically defined, is the order, position, or existential quality that allows the classification of a given variable as pertaining to a special set. Every relation must be self-consistent, that is, bind the relata without contradiction (that is, if every point on a line AB is defined as being equidistant to one and only one point on a given line PQ, then the lines are self-consistently related as parallel, but inconsistently, or in a contradictory fashion, related as perpendicular). Every relation must also be independent of every other type of relation that may apply to the same elements but that would be defined in terms of other conditions of pertinence. A topological relation binds the temporal-spatial values of the possible elements of a set. A functional relation is a univocal realization of such a type of relation that the construction of a new set of elements, each of which represents a value of a different element of the given set, is possible. The functional relation thus establishes a dominion over the constructed set by determining its possible elements. Arithmetic relations are simply functional; geometric relations involve the application of topological relations *upon* (projectively) or *into* (injectively) a geometric figure. Representational relations determine the construction of a geometric figure; transformative relations involve the application of relations in such a way that the elements of a given set become rearranged in a radically new way. The process of transformation may be finite or infinite.

[17] An *operation* is a special, that is, binary, type of functional relation. It is defined by a law of composition, and requires the pairing of any two elements in a given set so that another element of a new set is thereby constructed. The new set and the given set can now be redefined as subsets of a more general, inclusive set.

[18] Hermann Weyl, "The Mathematical Way of Thinking," *The World of Mathematics*, p. 1832 ff.

independence of their correlative but distinct internal operations, and thus reduce one set to another by canceling out any distinction between them.

The isomorphism of the subsets of the ego is constructed by the projection[19] of (S) functions upon the (A) subset. Thereby the (A) subset is transformed in such a manner that the (A) functions shadow the (S) functions. The vectors formed by this projection establish the ego transformations.[20] Henceforth (S) and (A) functions correspond biunivocally, so that one function of (S) is bound to one and only one function of (A), and one function of (A) is bound to one and only one function of (S).[21]

The functions of (S) and (A), which are now equivalent, are then projected upon the (N) subset. Thereby, the (N) subset is transformed in such a manner that the (N) functions shadow the (A) functions as well as the (S) functions. The vectors formed by this projection extend the ego transformations to include noetic functions.[22] The (SA), (AN), and (SN) vectors are now equivalent to (SAN) vectors, and each (S) function is bound to one and only one function of (A) as well as to one and only one function of (N). The (A) and (N) functions are correspondingly bound.

The isomorphism of the (S), (A), and (N) subsets then permits them to operate as a unit, which we call the ego.

II. *The Internal Organization of the Subsets: the Homomorphic Ego Operations of the Mothering-one*

The transformation of the subsets of the ego into isomorphic systems is a process of trial-and-error learning. The vectors that bind (S), (A), and (N)

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[19] Projection is a mathematical operation that preserves the "projective" properties of a given set in the construction or transformation of the shadow set. For example, a photograph of a three-dimensional figure is the "shadow" or "image" of the figure only in so far as the properties or characteristics of the original can be correlated to the properties or characteristics of the photograph. If original and shadow are isomorphic, all properties must be preserved, that is, projected (see W. W. Sawyer, "Transformations," *Prelude to Mathematics*, Penguin Books: Great Britain, 1955, p. 146 ff.).

[20] A projective transformation of the elements of a problem preserves the problem but *disguises* it so that it appears to be a totally different problem (see W. W. Sawyer, *op. cit.*, p. 65).

[21] An appendix to this paper reformulates these verbal statements in the symbols of mathematics and connects them in analytical order.

[22] A "noetic function" is any primary intellectual activity. Usually, intellectual activities are defined as processes of abstraction, judgment, and reasoning. The products of these processes are called concepts, propositions, and arguments. The process of abstraction, however, is not one simple process but a continuous series of transformative processes. The primitive *Urgedanke* or "proto-thought" is not yet a concept but an *eidetic image*. We can define an eidetic image as the product of a subjective process of intension, which "fills in," as it were, the "empty spaces" between one sense image and another sense image. By a process of intension (cf., Husserl: *Pariser Vorträge*, #A) the eidetic images are realized, that is, transformed into objects of consciousness. A mere sensation has no context: it has no place in the world, that is, no objectivity. However, when it is intended, it is given modes of objectivity by being placed in a context of "outside" or "inside," "now," "before," or "after," "equal," "less," or "more," "above" or "below," and "right," or "left." Only when the emptiness surrounding sense images becomes filled, are they connected to reality, that is, located in the world. Eidetic images fill the interstices between sense images, and, conversely, sense images are the boundaries of eidetic images. (The process of "thinking," that is, of making the world of experience intelligible, involves the projection of the intellectual "filling" process of creating eidetic images upon the external world. The classic axiom that "nature abhors a vacuum" is an example of this projection.) Thus reality is the binding of experience in an eidetic frame or the filling of an eidetic frame with experience. "Experiencing reality," therefore, requires both types of images, each delimiting the other. We might, then, define a concept as the sum total of all possible eidetic images surrounding a sense image.

functions in equivalence relations must, from instant to instant, be given a sufficiently narrow range of experience so that the functions that become co-ordinated are not too greatly divergent.[23] The groups of internal operations within each subset—the elements of (S), (A), and (N)—remain independent.[24] The elements of (S), (A), and (N) that condition the functions of each subset grow organically in a genetically and environmentally controlled manner.

Initially, the growing embryo is totally dependent upon the biochemical energy taken from the mother's body. This somatic interaction is entirely "one way" since only the embryo is at the "taking end" of the biochemical energy. Although the mother's blood stream, for example, absorbs the waste products of the embryo's metabolic processes, the mother does not take or receive anything by this activity, since it functions to further the growth of the embryo and does not serve any of her own needs. The realization, therefore, of the functional (S) relation between mother and embryo is *homomorphic*, that is, sequentially conditional and univocal.[25]

At the moment of the infant's birth, a new type of interaction begins.[26] The infant is no longer totally dependent, and his modes of interaction with the environment change as this environment is itself transformed. For example, the infant now breathes air through his lungs instead of taking the necessary oxygen from the mother's blood stream; vitamins, proteins, and other foods are now furnished through the mother's milk or a nutritional substitute only when they are available: the infant cannot automatically take what he requires through a placenta.

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[23] In relation to the external world, the ego can be defined as a series of instances and events emerging in a continual performance of the human individual in the course of his interaction with his physical and interpersonal environment. These instances can be ordinated as a series of "here-nows" in the continuum of experience. Each "here-now" is the simultaneity of a experiential instance with a *node* or intersection of (SA), (AN), and (SN) vectors. If the path of these intersection points from moment to moment changes direction frequently and drastically, the individual cannot orient himself in the world.

[24] This causal independence—a necessary condition of isomorphism—implies that somatic, affective, and noetic operations cannot be reduced to each other or substituted. They are materially distinct even when they are functionally equivalent.

[25] If isomorphism is defined as the connection between a given continuum and its symbolic scheme, then homomorphism can be defined as the connection between a given continuum and the symbolic scheme of one of its preselected dimensions or aspects. An isomorphic projection preserves *all* the properties of the original in the shadow; a homomorphic projection preserves *only one* type of property of the original in the shadow. For example, a contour sculpture of a certain mountain range is topologically isomorphic to the mountain range itself within the limits of the accuracy of the constant scale of measurements. However, this mountain range is topologically homomorphic to a flat map of the mountain range itself since only the horizontal measurements are represented on the map. As another example, we can take the reproduction of a painting. A four-color print is isomorphic to the painting, since each spot of color on the print has the pigmentation of the corresponding red, blue, yellow, black combination of its topological correlate in the painting. However when a print is made from fewer than the four different color plates that are superimposed in the four-color process, the painting is homomorphic to it. Every spot on the print has its topological equivalent co-ordinate in the painting: but only those spots on the painting that contain red, for example, have equivalent spots on the print from the red plate. The blue, yellow, and black spots in the painting have no co-ordinates. Thus the homomorphic relation between sets binds or limits the boundaries of the image or shadow set. In terms of this example, this means that the red print cannot contain more total spots than there are red spots in the original. An isomorphic relation fulfills the logical conditions of equivalence: it is reflexive, symmetrical, and transitive. A homomorphic relation does not fulfill these conditions: while it may be transitive, it is nonreflexive and asymmetrical.

[26] The manner in which the event of birth initiates functional transformations in the interaction between environment and organism represents a remarkably close analogy to the "unmasking" process through which, as geneticists describe it, DNA transformations occur during cell differentiation. A cell remains undifferentiated as long as the pairs of genes that administrate the differentiating process are masked. Layer by layer, the different pairs of genes become unmasked, that is, *spatially* separated from the chemical masking material that inhibited their activity before. First the ectoderm genes, then the endoderm, and finally the mesoderm genes are unmasked. The meshing together of the DNA and its masking material, RNA, is frequently compared to a closed zipper, and the unmasking process to an "unzipping" job. The actual mechanism of the process (that is, which enzymes operate the "zipper" under what circumstances) is not yet clearly understood by geneticists. Yet the relation of RNA to DNA seems to be a homomorphic relationship. RNA controls and stim-

In this new interaction the role of the mothering-one[27] is interpersonal rather than biological. It marks, therefore, the beginning of a new era of the infant's growth: his psychosexual development. Since the mothering-one's operations are now no longer genetically controlled according to the infant's needs, the (A) and (N) subsets of her ego become significant: her relation to her infant is now part of her ego operations. Her responses to the infant's needs are mediated by signals that she must perceive, interpret, and satisfy. She must function in a self-consistent manner, moment to moment, remaining always at the "giving" end of the relationship. The infant requires a consistently homomorphic relation with respect to his (S), (A), and (N) functions[28] so that they can become isomorphically organized into ego transformations while he grows. The relation is consistent only if the experiences provided from moment to moment are constructive and conformative, that is, satisfactory and acculturating, since trial-and-error learning cannot function without predictable or consistent sequences.[29]

Any inconsistency distorts the symmetry of the three ego subsets, so that the ego transformations operate instead as ego *deformations*.[30] When the in-

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ulates DNA in a one-way relation: RNA itself is controlled by RNASE and an RNASE inhibitor. If the RNA is "disturbed" by an oversupply of RNASE, the RNA-DNA relationship is disrupted, and the "unmasking" operation whereby the inhibiting of the DNA functions is transformed into a liberating of the DNA functions "goes wild." The organization of cellular growth then becomes chaotic, and the cell, left without control, becomes destructive (see John Pfeiffer, "The New Biology," *Medical News*, May 11, 1960; also Goldschmidt, R. B., *Theoretical Genetics* (U. of California Press: Berkeley, 1955).

[27] Since the functions of mothering an infant are interpersonal and reflect a social rather than a biological role, anyone can perform it as well as the biological mother of the infant. For this reason, the term "mothering-one" is used.

[28] Being causally and materially independent, (S), (A), and (N) elements grow or increase at different rates. At different stages of the individual's development, the rate of growth of one accelerates while that of another decelerates. The isomorphic ego transformations establish a biunivocal co-ordination of the (S), (A), and (N) functions, as these are operative from moment to moment, thereby inhibiting the growth of one and stimulating the growth of another so that the whole individual develops as a unit. The genetic "administration" of cell growth follows an analogous pattern.

[29] Freud refers to the "repetition compulsion" of children. This compulsion becomes particularly noticeable while the noetic functions are being organized. Children enjoy the endless repetion of the same game or story, since in this ritual, as in all rituals, the anticipated unfailingly comes to pass. Just as a correct prediction is deduced from a principle that is thereby validated (that is, the prediction provides "circumstancial evidence" of the presence of the external counterpart of the eidetic images inherent in the principle), so the correct anticipation of a future experience validates its reality and signifies the mastery of noetic trial and error.

[30] Cf., Hermann Weyl: [In empirical science, the symbolic scheme] ". . . of consecutive (formal) divisions is applied to the continuum of here-nows which we call the world . . . somehow our theoretical constructions must be put in contact with the observable facts." [However the observable facts are variable, changing from moment to moment with the position of the observer and the position of what is being observed.] "But a continuous deformation, a one-to-one continuous transformation of the whole picture does not affect the value of the

consistency is minor, in quality and in frequency, a continuous process of ego deformation would restore the isomorphism from moment to moment by transmitting the distortion from one subset to another. As long as the process of deformation continued, the (*S*), (*A*), and (*N*) functions would remain biconditionally related, thereby restoring the symmetry of the subsets and canceling out the original distortion, through a feedback dynamism.[31] The continuous processes of deformation serve as ego defenses in ego operations, which are now restricted to those (*SAN*) vectors in which the (*S*), (*A*), and (*N*) functions are bound with relative stability.[32] When the inconsistency is major, the ego subsets fail to become isomorphic: the independent (*S*), (*A*), and (*N*) functions are *not* transformed into subsets of the ego. Instead, the growing (*S*), (*A*), and (*N*) functions of the infant become related as ego *conformations*; that is, they become isomorphically related to the corresponding functions of the mothering-one. Thus the infant's functions organize the (*S*), (*A*), and (*N*) subsets symmetrically only to the extent to which these functions are synchronic with the mothering-one's operations. When this *apparently* self-sustaining individual is separated from the mothering-one as he organically develops beyond infancy and begins to operate in other interpersonal contexts, the synchronization fails to be realized, and the ego subsets function autistically. The ego then regresses to that stage of organization at which synchronization displaced ego transformation or deformation.[33]

III. *The Conditions of Schizophrenogenesis*

The mothering-one is schizophrenogenetic when the deformed isomorphism of her ego subsets is about to fail so that she cannot relate homomorphically to her infant. The following conditions *illustrate*[34] the factors that contribute to

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fact. Isomorphic pictures lead to the same results concerning observable facts. That is, in its most general form, the principle of relativity." Thus a process of continuous deformation preserves the isomorphism of dynamic systems ("The Mathematical Way of Thinking," *The World of Mathematics*, Vol. III, p. 1845).

[31] In cybernetic machines, the element of control is exemplified in a mechanical device called the "governor" that operates on the principle of feedback: that is, "the working of the machine at a given time is itself a stimulus for the modification of the future course of its working." That is, the machine continually corrects the error of some input by transmitting a compensatory correction to all subsequent factors of operations in the process of problem solving. The output, which is then no longer the solution to the problem as originally (but incorrectly) given, is then used to correct the original input. Now the problem is solved all over again. Each time, the error is diminished. When input and output match, the necessary correction is zero, and the input is constant (see Abraham Kaplan, *op. cit.*, *The World of Mathematics*, Vol. II, p. 1307 ff.).

[32] The defenses, since they are processes, not structures, continue to consume energy that might have been used for the more complete and efficient organization of the ego transformations as well as for more extensive ego operations.

[33] If, while he is regressed, this disorganized individual is offered a homomorphic relation that is sufficiently constant, complete, and enduring to permit the formation of new (*SAN*) vectors that now reorganize the (*S*), (*A*), and (*N*) subsets isomorphically, the ego can gradually become sufficiently stable to operate independently. We suggest that psychotherapy can function as such a relation between therapist and patient.

[34] Cf., Hermann Weyl: "Of course, somehow our theoretical constructions must be put in contact with the observable facts. The historic development of our theories proceeds by heuristic arguments over a long and devious road and in many steps from experience to construction. *But systematic exposition should go the other way:* first develop the theoretical scheme *without attempting to define individually* by appropriate measurements the symbols occurring in it as space-time coordinates . . ., then describe, *as it were in one breath*, the contact of the

this failure:

(1) In her own infancy the schizophrenogenetic mothering-one was subjected to certain inconsistencies. As a result her ego transformations were deformed, shadowing the ego deformations of the grandmother. The grandmother was sufficiently stable to relate homomorphically to the mothering-one with enough consistency to permit minimal ego organization. This factor, therefore, of schizophrenogenesis follows a pattern of matrilinear transmission.

(2) The minimal ego organization of the mothering-one permits her to relate homomorphically to her infants as long as she is not subjected to specific stresses that break the continuity of the precarious isomorphism of her ego. However, severe specific stresses disrupt her internal feedback of ego defenses, and she is unable to cancel out the new distortions. However, by relating to her infant isomorphically, she establishes a continuous conformation (or synchronization) that operates as a compensating feedback dynamism of her ego deformations. Thus the isomorphic mothering-one–infant relationship that prevents the organization of the infant's ego serves to preserve the organization of the mothering-one's ego.

(3) The degree of inconsistency severe enough to be schizophrenogenetic is relative to the genetically inherited preorganization of the infant's (S) functions. The genetic factors must be determined empirically. It is significant, however, that current research indicates that: "the extent and nature of possible genetic factors (in schizophrenia) remain uncertain," that "no monogenic hypothesis is compatible with all the data recorded," and that "the data recorded on schizophrenia are complex and do not conform to any simple genetic hypothesis."[35]

There are, therefore, three conditions of schizophrenogenesis: (1) the ego of the mothering-one must be deformed, (2) she must be subjected to specific stresses, and (3) the infant must be handicapped by certain inherited (S) factors.

IV. *An Illustration of Schizophrenogenesis*

The theoretical construct elaborated here remains an exercise in the logic of sets unless it can serve as a symbolic scheme for the interpretation of observable events. In more than 25 years of clinical experience in Puerto Rico the following cultural factors in the families of schizophrenics have been noted:

(1) The mothering-one has a deformed ego because she is the daughter of a narcissistic and seductive woman and an aloof and rigid father whose strong sense of morality kept him in the home and encouraged him to protect his wife. The ego deformations of the mothering-one shadow those of her narcissistic mother.

(2) The mothering-one is married to a weak and ineffectual man who threat-

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whole system with (representative) observable facts." Weyl also asserts that: "the business of the constructive mathematician is *not* to draw logical conclusions. Indeed his arguments and propositions are merely an accompaniment of his actions, his carrying out of constructions" ("The Mathematical Way of Thinking," *The World of Mathematics*, Vol. III, p. 1845). In other words, this paper does not seek to offer "proof" of "schizophrenogenesis" as an empirically valid concept, nor does it posit any necessary *causal* connection between the factors or conditions of schizophrenogenesis and the concrete phenomena of schizophrenia.

[35] Ian Gregory, "Genetic Factors in Schizophrenia," *The American Journal of Psychiatry* (Vol. 116, No. 11), May 1960, p. 971.

ens her, at the moment of the infant's birth, with loss of love and loss of prestige. This threat constitutes a *specific* stress that breaks down the precarious isomorphism of her deformed ego.

In other cultures, different patterns may exemplify the processes we have tried to describe. It is our hope that the formulations stated in this paper may stimulate further attempts at theory construction, invite critical scrutiny, and initiate further research.

*APPENDIX**

CULTURAL STRESSES AND SCHIZOPHRENOGENESIS IN THE MOTHERING-ONE IN PUERTO RICO

Given:

(A) *Universal set:* $[E]$

The ego; the universal operational set to which all functions of human behavior pertain.

Subsets:

$$\left.\begin{array}{l}(1)\ (S)\\ (2)\ (A)\\ (3)\ (N)\end{array}\right. \quad [(S);(A);(N)] \epsilon E$$

(1) The somatic subset of the ego.
(2) The affective subset of the ego.
(3) The noetic subset of the ego.

(B) *Topological elements:*

$$\left.\begin{array}{ll}(1) & (S)\\ & (s, s', s'', \cdots, s^n)\\ (2) & (A)\\ & (a, a', a'', \cdots, a^n)\cdot\\ (3) & (N)\\ & (n, n', n'', \cdots, n^n)\end{array}\right\} \epsilon E$$

(1) Somatic elements, structured by trial and error in the course of evolution; genetically constructed.

(2) Affects, signaling the quality of the interpersonal environment from moment to moment in a benevolence-hostility continuum.

(3) Eidetic images, acting as elements of conceptual syntheses that realize sense experiences as objects in the world.

(C) *Functions:*

Topological elements are paired associatively by trial and error. The relation binds the second member of each pair to the first, thereby creating a function of behavior.

$$\begin{array}{ll}(1) & (s \to s') = f(S)\\ (2) & (s' \to s'') = f'(S)\\ (3) & (s'' \to s''') = f''(S)\cdots\\ & \therefore (S) = [F(S)]\end{array}$$

Somatic elements are paired as stimulus-response functions until they are bound within the limits of survival conditions and operate internally as *vectors*[1] transforming subset (S) into an operational subset.

Direction, length, and sense of each (S) vector is empirically given from instance to instance, as the individual grows organically.[2]

I. *THE REALIZATION OF THE FUNCTIONAL RELATION: THE TRANSFORMATIVE ORGANIZATION OF THE EGO*

Transformation of topological sets into algebraic subsets

(A) *Given:*

$$\begin{array}{ll}(1) & (s \to s') = f(S);\\ & (s' \to s'') = f'(S);\ \cdots;\\ (2) & (A)\\ & (a, a', a'', \cdots, a^n);\\ (3) & (N)\\ & (n, n', n'', \cdots, n^n)\end{array}$$

(1) Organized genetically in biological development.

(2) and (3) Given *potentially* in biological development; stimulated to operate through interaction with interpersonal environment after birth.

(B) *Operations:*

$$(s \rightarrow s')\ \mathrm{o}\ (a)$$
$$(s' \rightarrow s'')\ \mathrm{o}\ (a'), \cdots$$

The relations between (S) elements are projected upon (A) elements. Thereby (A) elements become paired, each pair operating internally as a *vector.*[3]

$$(s \rightarrow s') \Longrightarrow (a \rightarrow a')$$
$$(s' \rightarrow s'') \Longrightarrow (a' \rightarrow a''), \cdots,$$

$$\therefore f(A) \equiv f(S);$$
$$f'(A) \equiv f'(S); \cdots;$$

$$\therefore (S) \overset{i}{\leftrightarrow} (A)$$

Through the organization of (A) elements (A) functions are constructed, which are operationally ***equivalent*** to (S) functions. When every potential element has been organized, (S) and (A) operate biconditionally as isomorphic systems.

$$(s \rightarrow s')\ \mathrm{v}\ \mathrm{v}\ (a \rightarrow a')\ \mathrm{o}\ (n),$$
$$(s' \rightarrow s'')\ \mathrm{v}\ (a' \rightarrow a'')\ \mathrm{o}\ (n'),$$
$$(s'' \rightarrow s''')\ \mathrm{v}\ (a'' \rightarrow a''')\ \mathrm{o}\ (n''), \cdots,$$

Either the relations between (S) elements *or* the relations between (A) elements are projected upon (N) elements. Thereby (N) elements become paired, each pair operating internally as a *vector.*[4]

$$(s \rightarrow s')\ \mathrm{v}\ (a \rightarrow a') \Longrightarrow (n \rightarrow n'),$$
$$(s' \rightarrow s'')\ \mathrm{v}\ (a' \rightarrow a'') \Longrightarrow (n' \rightarrow n''),$$
$$(s'' + s''')\ \mathrm{v}\ (a'' \rightarrow a''') \Longrightarrow (n'' \rightarrow n'''), \cdots,$$

$$\therefore f(N) \equiv f(S)\ \mathrm{v}\ f(A);$$
$$f'(N) \equiv f'(S)\ \mathrm{v}\ f'(A);$$
$$f''(N) \equiv f''(S) f''(S)\ \mathrm{v}\ f''(A); \cdots;$$

As (N) elements become paired, (N) functions are constructed, equivalent to the corresponding (S) or (A) functions.

$$\therefore [(S) \overset{i}{\leftrightarrow} (A) \overset{i}{\leftrightarrow} (N)] \in E$$

Since the corresponding (S) and (A) functions are equivalent, (S), (A), and (N) operate as isomorphic systems. The ego is transformed into a self-consistent unit of operations.

II. *THE INTERNAL ORGANIZATION OF THE SUBSETS: THE HOMOMORPHIC EGO OPERATIONS OF THE MOTHERING-ONE*

(A) *Given:*

$$(1)\quad \left.\begin{array}{c} (SM) \\ (sm, sm', sm'', \cdots, sm^n) \\ (AM) \\ (am, am', am'', \cdots, am^n) \\ (NM) \\ (nm, nm', nm'', \cdots, nm^n) \end{array}\right\} \in EM$$

(1) The ego set of the mothering-one, with its somatic, affective, and noetic subsets, each with its proper elements.

$$[(SM) \overset{i}{\leftrightarrow} (AM) \overset{i}{\leftrightarrow} (NM)] \in EM$$

If the mothering-one is "normal," her ego subsets are isomorphic.

$$(2)\quad \left.\begin{array}{c} (SI) \\ (si, si', si'', \cdots, si^n) \\ (AI) \\ (ai, ai', ai'', \cdots, ai^n) \\ (NI) \\ (ni, ni', ni'', \cdots, ni^n) \end{array}\right\} \in EI$$

(2) The ego set of the infant, with the topological elements of the three subsets.

$$[(SI); (AI); (NI)] \in EI$$

The topological elements are not yet paired and do not function consistently.

(B) *Operations: realization of homomorphic relation* $EM \leqq EI$

$$(1)\quad \begin{tikzcd} {[(SM) \overset{i}{\leftrightarrow} (AM) \overset{i}{\leftrightarrow} (NM)]} \arrow[d, "h"'] \\ {[(SI)\ ;\ (AI)\ ;\ (NI)]} \end{tikzcd}$$

(1) The growing embryo takes from the mother's soma what it requires in a univocal, sequential dependence. Process is genetically controlled.

$$\therefore f(SM) \leqq f(SI);\quad f'(SM) \leqq f'(SI);\quad f''(SM) \leqq f''(SI); \cdots;$$

Therefore, the somatic functions of the embryo-infant become organized in a manner that *preserves in the infant* the organization of the somatic functions of the mother.

$$(2)\quad \begin{tikzcd} {[(SM)} \arrow[r, leftrightarrow, "i"] \arrow[d, "h"'] & (AM) \arrow[r, leftrightarrow, "i"] \arrow[d, "h"'] & (NM)] \arrow[d, "h"'] \\ {[(SI)} \arrow[r] & (AI) \arrow[r] & (NI)] \end{tikzcd}$$

(2) By self-consistent ego operations the mothering-one continues, after the infant's birth, to relate homomorphically to the infant, thereby providing consistent experiences.

$$\therefore (am \rightarrow am') \leqq (ai \rightarrow ai'),\ (am' \rightarrow am'') \leqq (ai' \rightarrow ai''), \cdots,$$
$$(nm \rightarrow nm') \leqq (ni \rightarrow ni'),\ (nm' \rightarrow nm'') \leqq (ni' \rightarrow ni''), \cdots,$$

Therefore, the affective and noetic elements of the infant's ego are ordered in a consistent *sequence* which *preserves* the order of the mothering-one's ego organization.

$$\therefore [(SI) \overset{i}{\leftrightarrow} (AI) \overset{i}{\leftrightarrow} (NI)] \in EI$$

The transformative ego relations of the infant can now realize the isomorphism of the three sets, since association synchronically pairs the shadow elements.

(C) *Ego deformation:*

$$\begin{tikzcd} {[(SM)} \arrow[r] \arrow[d, "h"'] & (AM) \arrow[r, leftrightarrow, "i"] & (NM)] \arrow[d, "h"'] & {} \arrow[l] \\ {[(SI)} \arrow[r] & (AI) \arrow[r, leftrightarrow, "i"] \arrow[u, "h"'] & (NI)] & {} \arrow[l] \end{tikzcd}$$

If the mothering-one's ego organization is faulty, her ego operations are inconsistently homomorphic. This inconsistency is preserved in the infant in parallel ego deformations.

Continuous deformation: feedback dynamism;

$$[f(SI) \rightarrow f'(AI) \rightarrow f'(NI)] \leftrightarrows f'(SI)$$
$$[f'(SI) \rightarrow f''(AI) \rightarrow f''(NI)] \leftrightarrows f''(SI), \cdots,$$

A process of continuous deformation preserves the isomorphism from moment to moment. Ego operates as a unit as defensive process continues.

(D) *Ego conformation:*

$$\begin{tikzcd} {[(SM)} \arrow[r] \arrow[d, leftrightarrow, "i"'] & (AM) \arrow[r] \arrow[d, leftrightarrow, "i"'] & (NM)] \arrow[r, leftrightarrows] \arrow[d, leftrightarrow, "i"'] & (SI) \\ {[(SI)} \arrow[r, phantom, "\parallel"] & (AI) \arrow[r, phantom, "\parallel"] & (NI)] & \end{tikzcd}$$

If the mothering-one's ego is severely disorganized by new distortions, she cannot relate homomorphically to her infant. Instead, the infant's functions *conform* to hers, forming three isomorphic pairs. The infant's consistent isomorphic shadows operate as a compensatory feedback dynamism, reorganizing the mothering-one's ego.

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* The system of mathematical notation and the method of relating enunciations is based on Alfred Tarski's "Symbolic Logic" (see *World of Mathematics*, p. 1901 ff.) as explained in a seminar on "The Philosophy of Contemporary Mathematics" by Tomás Rodríguez-Bachiller, College of Science and Engineering, University of Puerto Rico, Rio Piedras, Puerto Rico; formerly Department of Mathematics, University of Madrid, Spain. Rodríguez-Bachiller's guidance is gratefully acknowledged.

[1] See, Cassius J. Keyser: "A vector has its essential and complete being in having a length, a direction, and a sense" ("The Group Concept," *The World of Mathematics*, p. 1544 ff.).

[2] *Direction* $f(S)$*:* empirically given as environmental stimulus to internal response, or as internal stimulus to response projected into environment. (e.g. a visual hallucination of an object reverses the direction of seeing the object.) *Length* $f(S)$*:* the synapse or other nerve path connecting (s) with (s'). *Sense:* the statistical frequency of here-nows in which function operates as mastery of trial and error learning. Constant mastery $= 1$; total error $= 0$; inconsistent association $= +0.5$.

[3] The direction and length of $f(A)$ are equivalent to those of $f(S)$. The sense, or quality, of $f(A)$ is analogous: $f(S)$ operates in the survival continuum; $f(A)$ operates in the benevolence-hostility continuum.

[4] The direction and length of $f(N)$ are equivalent to those of $f(S)$. The sense, or quality, of $f(N)$ operates in the identity-contradiction, or affirmation-denial, continuum.

LEVEL OF ASPIRATION AND MENTAL DISORDER: A RESEARCH PROPOSAL*

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Although it is generally assumed that the migration experience correlates with high rates of mental illness, this assumption has not been unequivocally established. This point of view maintains that the migrant is either psychologically disturbed prior to migration or that the impact of a new and strange environment precipitates mental breakdown, or both. Odegaard[15] and Malzberg and Lee[13] are most frequently referred to as having supplied empirical confirmations of this position. On the other hand, studies such as those by Clausen and Kohn,[3] Hollingshead and Redlich,[4] Lapouse *et al.*,[10] and Tietze *et al.*,[18] which do not confirm it, are less frequently noted. It is also often overlooked that in another study Odegaard[16] found that rates of mental illness were high only for those migrating to Oslo, Norway, from other large cities, whereas migrants from rural areas showed low rates. More recently Kleiner and Parker,[5] studying the differential rates of first admissions for mental illness of migrant and nonmigrant Negroes in Pennsylvania, found that, contrary to the more widely held view, the rates of mental illness for southern migrants were lower than the rates for the Pennsylvania native born, particularly for the diagnosis of schizophrenia. At the same time the rates for migrants from other northern states were higher than for the native born. The fact that southern and northern migrants showed different rates of mental illness relative to the native born and to each other would suggest that any generalization about migration and mental disorder is not feasible.

The inconsistency in the data of migration and mental disorder is also present in the findings relative to other sociocultural factors. There exists a pressing need to go beyond gross correlations to a finer level of analysis. This can be accomplished by specifying the explanatory variables that intervene between the sociocultural factors and mental disorder. Such variables might explain apparent inconsistencies. Another way of accomplishing the same end would be to specify the sociocultural matrix in which a particular correlation holds. We would then be able to relate mental disorder to a pattern of sociocultural factors rather than to a single variable.

In a series of studies by Kleiner *et al.*,[7-9] and Kleiner,[6] it was observed that the incidence of schizophrenia was significantly higher for Negroes in contrast to whites, for Catholics in contrast to Protestants, for Baptists and Methodists in contrast to Presbyterians and Episcopalians and, finally, for women in con-

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trast to men. The authors raised the question of whether the diagnostic differences characterizing these groups could be explained by a common factor. Efforts to order the various groups used in each of the four studies in terms of "social class" as a possible common factor were not successful because occupation and education, major components of a "class" index, were inconsistent from one study to the next and did not correlate with each other.

The data on occupation, education, and income of all male Negro first admissions (N = 458) to the Eastern Mental Health Reception Center in Philadelphia for a nine-month period were examined to determine if the differences between the southern migrants and the native born could be attributed to "social class" differences. Both groups showed the same occupational distribution. However, the native-born group was significantly more educated and had significantly lower income than the southern migrants. Although Hollingshead and Redlich found that the incidence of schizophrenic reactions increased as one moved down the "social class" ladder, our data indicate that the differences between migrants and nonmigrants cannot be explained in terms of "social class" either.

In order to establish the validity of any hypothesis about factors underlying mental disorder, one must also eliminate the possibility that hospitalization figures are the result of artifacts such as receptivity to psychiatric treatment and/or familiarity with community facilities, and the reliability of incidence figures as estimates of mental illness in a given population. This report will deal with factors possibly underlying mental disorders and also social artifacts affecting hospitalization rates.

If it is valid to assume that a person's goals are largely a function of his level of education, then one may use this as a measure of his level of aspiration. One may also use occupation or income as measures of achievement. Using Lewin[12] and his associates' idea that a discrepancy between achievement and level of aspiration is a source of frustration, we assume further that frustration creates stress that contributes significantly to mental illness. Thus we hypothesize that the greater the discrepancy between achievement and level of aspiration, the greater the incidence of mental illness, particularly of schizophrenic reactions. In the nine-month sample taken from the state psychiatric evaluation center, the native-born male Negroes had significantly more education, that is, higher aspirations, than the southern migrant male Negroes. On the other hand both groups showed the same occupational attainment, that is, the same achievement. Therefore the native-born group had a larger discrepancy and should show more mental illness. As already indicated they did manifest significantly more mental disorder, especially schizophrenia. Using income as a second measure of achievement, the native-born Negro male group had significantly lower income, that is, lower achievement, than the southern migrant male group. Thus the native group with significantly higher education and significantly lower income than the migrant group again had a larger discrepancy between "level of aspiration" and achievement.

To test the generality of this discrepancy notion, a sample of native-born male white patients, evaluated at the same psychiatric facility during the same time period, were compared to the native-born male Negro and southern migrant male Negro groups. The native Negro group had significantly more education but the same occupational achievement as the native white group. This larger discrepancy, as predicted, yielded a higher proportion of mental illness in the former. Using income as the measure of achievement, the native Negro group, with a higher educational attainment and significantly lower income than the native white group, again showed a larger discrepancy. On the other hand the native white group and the southern migrant Negro group had the same educational attainment and occupational achievement. They also had the same proportion of mental illness.

These findings may be explained in terms of social attitudes toward psychiatry. It may be that the more highly educated native-born Negro is more aware of psychiatric facilities and/or less resistant to treatment, and therefore shows more mental illness. A study was made of the sources of referral of all first admissions to the Eastern Mental Health Psychiatric Evaluation Center in Philadelphia for 1958 and 1959 ($N = 1795$). It was assumed that persons referred from the police and courts would, in general, be less aware of psychiatric facilities and/or more resistant to treatment than those referred by a social service agency or medical facility. For males and females the native Negro and southern migrant Negro groups showed the same referral rate from these law-enforcement agencies. A second method of examining the possibility that the more highly educated are less resistant to psychiatric treatment is to compare the natives and migrants in terms of the rate of refusal of psychiatric recommendations for treatment. For both sexes, the native and migrant groups showed the same refusal rate. Thus to the extent that referral source and refusal rate reflect what we have assumed them to mean, then attitudes toward psychiatry cannot explain the findings. One may ask if it is legitimate to use these figures because they do not include the number of untreated non-institutionalized mentally ill. Pasamanick *et al.*[17] have shown that the rate of undiagnosed psychoses in the Baltimore nonwhite community was only $^{0.3}/_{1000}$. To the extent that this low rate applies to Philadelphia, one may conclude that the hospitalized group may be considered fairly representative of the Negro population.

In their studies of schizophrenic reactions relative to other diagnoses for first admissions to a psychiatric facility, Tuckman and Kleiner[19] studied the total male first admissions to the state psychiatric evaluation center for the nine-month period of June 1958 to March 1959, and the two-year period from January 1958 to December 1959. In the first sample of 412 cases all those above the median education of a particular occupational classification were considered high aspirants, and all those below the median were considered low aspirants, consistent with our previous usage of education as a measure of level of aspiration. Schizophrenia was higher for the high aspirants in the white unskilled, white semiskilled, Negro unskilled, and Negro semiskilled groups. Due to the size of the sample it was not possible to carry this analysis to other occupational classifications. In the second sample of 2004 cases the same procedure was followed. The high aspirants in each of the unskilled, semiskilled, and skilled classifications in the white Protestant, white Catholic, Negro Protestant, and the Negro Catholic subpopulations showed more schizophrenic reactions. Where it was possible to subdivide the education range into four groups that might be called very low, low, high, and very high aspirants, there was a clear trend for the relative incidence rates for schizophrenia to increase as one moved from the very low aspirants to the very high aspirants.

An alternative interpretation of these data is that the low occupational achievement of the schizophrenic relative to his education may be a result of the illness. A person who is mentally ill may not be able to hold a position for which he is educationally qualified, and therefore settles for lower-level jobs. Hollingshead and Redlich[4] and Clausen and Kohn[3] have shown that this "downward drift" does not occur. Assuming it were true, being forced to take an inferior job (that is, the discrepancy) may precipitate the psychotic breakdown leading to hospitalization. In addition to the logical problem there is also the empirical problem of demonstrating latent mental illness, which requires definition of the illness and the creating of instruments for its measurement. Tuckman and Kleiner,[19] considering this alternative interpretation and observing that schizophrenia increased as the discrepancy increased, developed a procedure for ordering normal groups by their potential for schizophrenia. Keeping in mind that there is a distribution of education from very low to very high attainment in any given "normal" occupational classification, we can create a constant discrepancy by selecting an arbitrary education level a given number of years above the median of the occupational group. If we divide the number of people at or above the cutoff point by the total population in the occupational category, we have the proportion of people with a discrepancy range that is most closely correlated with schizophrenia. As the proportion increases from one group to another, schizophrenia should increase. Proportions based on the 1950 census were computed for each occupational classification, excluding the agricultural categories, for white males, white females, nonwhite males, and nonwhite females to test this hypothesis. The over-all estimate for each group was a composite of the proportions for all occupational classifications and weighted according to the size of the population in each occupational classification. The over-all proportions for the four groups increased in the order listed and correlated perfectly with the incidence rates of schizophrenia for these groups. The correlation cannot be attributed to the "downward drift" of patients since the proportions are based on the normal population. It may also be noted that the procedure of computing a proportion for each occupation instead of for white males as a whole is based on the assumption that a person evaluates his discrepancy relative to the group he considers himself a member of, here assumed to be his occupational classification.

Although the findings cited above are very suggestive for relating the discrepancy between aspiration and achievement to mental disorder, it is obvious that we have made a number of assumptions and inferences about the psychological meaning of education, occupation, and income. In addition these particular factors may not provide the most meaningful and important bases from which to predict the development of mental illness. A survey of the literature in this area indicates that there exist innumerable statements and speculative hypotheses concerning the pathogenic aspects of achievement striving and frustration. However, there has been no methodologically rigorous research on this question.

Two of us (R. J. K. and S. P.) recently obtained a grant from the National Institute of Mental Health, Public Health Service, Bethesda, Md., to study more directly the role of mobility strivings, level of aspiration, and discrepancy, in an analysis of differences in the rates of mental disorder between a migrant and a nonmigrant Negro population. The research involves interviews with approximately 1500 Negroes between the ages of 20 to 59 inclusive who are living in the community, and a comparable number of Negroes in the same age group who have been diagnosed as being in need of psychiatric treatment. The community population was selected according to a multistage sampling design intended to yield a representative sample of the total Negro population in the city of Philadelphia. The patient sample will consist of all psychiatric cases processed through the Eastern Mental Health Reception Center in Philadelphia,* other selected psychiatric agencies in the community, and a sample of Negro patients being treated by psychiatrists in private practice. Selected demographic and social data will also be collected on eligible cases handled by all inpatient and outpatient facilities in Philadelphia. This population will consist of patients seen during the period from March 1960 to March 1961 and diagnosed as being in need of treatment. The data from both sample populations will be based on face-to-face interviews lasting approximately 1 hour and 15 minutes and consisting of both precoded and open-ended questions. It should be noted that unlike most of the recent large mental health surveys, we plan to obtain interviews of the same magnitude and depth from the ill as well as the "normal" groups. Reliability checks of the internal consistency of the interview data will be incorporated in the interviews with the ill population. Our experience thus far indicates that reliable and rich interviews can be obtained from the vast majority of psychiatric cases, provided that the interviewing staff is well trained.

Information will be gathered on such things as migratory status (defined as place of early socialization rather than place of birth), aspirations and achievement in education, occupation, and income, actual and desired realtionships with whites and other Negroes, self-concept and ideal self-image, perceived barriers to goal achievement, historical aspects of objective status mobility, and perceived movement (or lack of movement) toward general valued goals as defined by the respondents themselves. At the present time the community survey has been completed and is in the process of being prepared for analysis. The completion rate for this sample was over 90 per cent. The patient interviews should be finished by March 1961. All of the interviewing is being carried out by Negro interviewers.

As already indicated the underlying idea of the study is concerned with the relationship of the discrepancy between level of aspiration and achievement and the development of mental disorder. It would be naive to assume that this one factor by itself could produce emotional illness. Among other factors that have to be considered simultaneously is the emotional investment in the particular aspiration and discrepancy area. In addition the degree of reality of the particular aspiration, that is, the probability that the individual attaches to reaching the stated aspiration level, may also influence the amount of stress resulting from the discrepancy. It is possible to visualize the relationship of these variables in the following equation:

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* This agency is a state-supported centralized diagnostic and referral center for Philadelphia. Cases are processed in this agency and then sent to various inpatient and outpatient facilities for treatment.

$$\text{Stress} = F\,((LA\text{-}ACH) \times INT \times PA)$$

F = function of; LA = level of aspiration; ACH = achievement; INT = intensity of desire for stated LA; PA = probability of achievement.

Although this hypothetical "stress" equation appears to be reasonable, the problems and questions arising from the use of the discrepancy concept are by no means exhausted. For example, will discrepancies of equal magnitude have the same psychological import to individuals with different past experiences in goal attainment? It may well be that the individual who regards himself as a "success" (based on his evaluation of past attainments) will react quite differently to the same discrepancy than one who considers himself a "failure." Another problem in evaluating the psychological meaning of equal discrepancies stems from the multiplicity of reference-group values that are used by different individuals and by different groups in evaluating their attainments. These reference values may stem from the unique and idiosyncratic experience of the individual, from the particular formal or informal groups that he considers himself a member of, from the social class to which he belongs or would like to belong, or from identification with a given ethnic or religious group. It is quite clear that the values attached to attainment of particular goals and the stress stemming from discrepancies will depend on the operative reference group or groups. This can be illustrated by a problem that we anticipate in the analysis of our data. It may be that two individuals will have equal discrepancies in a particular area of goal striving. However, one individual is in the upper end of the range for achievement in his group (that is, society, ethnic group, or occupational group), while the other individual is in the lower. Will discrepancies of equal magnitude have the same meaning and stress implications for both these individuals? Can we deal with the magnitude of the discrepancy alone and disregard the fact that one man is a physician earning $15,000, while the other is an unskilled laborer earning $3000? Our data will permit us to explore this question with regard to our sample populations. We hope to evaluate the relative importance of different reference groups for Southern migrant versus native Philadelphia Negroes, upper- versus lower-class Negroes, and mentally ill versus normal individuals.

Another problem with which we are concerned is the relationship of status position to mental disorder. The individual's objective status position, his past changes in status position, and his aspirations for the future, are crucial issues for our study. What criteria does one use for determining status position, and what weights are to be assigned to these criteria? General characterizations of the "American class system" or the class criteria used in a midwestern town are of little help in dealing with our population. Indeed we feel that in general too little attention has been devoted to these questions in social-psychiatric studies. Hollingshead and Redlich assigned almost twice as much weight to occupation as to education and place of residence. An analysis of a subsample of our community responses indicate that occupation, as a criterion of status position, ranks fifth, behind education, income, neighborhood, and family background. A composite index of status position, consisting of the criteria actually used by this population, will be constructed and utilized in the further analysis of the data. It may be that the inconsistency of the position from one criterion to another is an important sociological concomitant of mental disorder. The research reviewed at the beginning of this paper is very suggestive in this direction. Thus it may be that it is the variability, and not only the composite index of status position, that makes this problem an important one for social-psychiatric investigation.

Those acquainted with the work of Lewin[11] and his associates[12] will be aware of the derivation of some of our thinking on aspiration theory. Whereas most published empirical research in this area has been confined to the psychology laboratory, we are attempting to apply some of the theoretical findings to an actual social problem. It appears reasonable to assume that aspirations set by an individual in actual life are for the most part more meaningful and provide more motivational drive than those supplied in laboratory experiments. Also, the problem of evaluating one's probability of attaining a particular goal is probably more complex in the real-life situation, and the consequences of failure more ego-involved. Lewin[11] suggests that subjective feelings of success or failure in movement toward a goal depend upon how the individual relates himself to the result. Failure to reach a goal or to locomote toward a goal may be explained in terms of a defect or fault within the self, or as a barrier that is imposed by external forces. One may hypothesize that the person who "internalizes" the causes of failure is more likely to experience a loss of self-esteem and is more prone to develop a mental disorder. On the other hand it may be just as (or more) stressful and pathogenic to feel powerless in a world imbued by external forces with which the individual cannot cope. No simple or a priori logical answers can be given to such questions. By obtaining data on the types of reasons an individual gives to explain his failure to reach valued goals, and by gauging the discrepancy between his self-image and ideal self-image, we may be able to cast light on some of the variables that intervene between unsatisfied goal strivings and mental disorder.

Another very interesting theoretical point raised by Lewin *et al.*[12] and Atkinson[1,2] deals with the meaning of the probability that the individual attaches to goal achievement. In the stress equation presented above, an assumption was made that, all other factors remaining equal, the greater the individual's subjective probability of obtaining a particular level of aspiration, the greater will be his stress resulting from a discrepancy between achievement and aspiration in this area. Probability here is equated with the reality of the goal for the person. However, some of the research cited above indicates the possibility that there may be a curvilinear relationship between probability and stress. The reasoning is that the individual with the strongest motivation will select goals that he has (approximately) a 50:50 chance of reaching. On the one hand, one who is characterized by a strong fear of failure will select tasks that have either a very high or a very low probability of success. If he fails in a task that is extremely difficult, he then has no cause for self-reproach. On the other hand, if he selects tasks that are very easy (that is, high probability), he thereby "protects" himself against failure. Thus probability statements may operate as defense mechanisms rather than an indication of the "reality" of the aspiration. If the former is true, then one might predict that there would be a tendency for the "normal" population to have aspirations that fluctuate around a 50:50 chance of being achieved. On the other hand the mentally ill group should show a tendency to select aspirations that have either a very low or a very high probability of success. Within the mentally ill group we might further find that neurotics give very high probability estimates to their aspirations, while schizophrenics give very low ones.

To investigate the relationship between achievement behavior as defined by our questionnaire and as defined by a projective device, the Need Achievement Test developed by McClelland *et al.*[14] was administered to all respondents between the ages of 25 and 29 inclusive. This instrument, a modification of the Thematic Apperception Test, attempts to measure the intensity of a generalized drive for goal achievement. This drive may be akin to what we have called the degree of emotional involvement in a level of aspiration; however, the questionnaire taps involvement with specific aspirations. If the projective measure of need achievement correlates significantly with all of the questions on "involvement," we might infer that both are measuring a similar phenomenon. The Need Achievement Test also provides the opportunity to determine a generalized optimism or pessimism relative to goal achievement. If we find that the results of the Need Achievement Test correlate significantly with the combined probability responses in our questionnaire, then we may assume that the latter indicates a generalized orientation rather than a reality determined probability of success in a specific area.

In conclusion we call attention to the potential significance of research in this area for understanding mental health problems in many under-developed areas of the world. In such areas as Africa, South America, and India one sees the large-scale movements of peoples from relatively rural and traditionalistic societies, where status is largely ascribed, to the urban competitive societies of status achievement. These changes, taking place with various degrees of rapidity, inevitably involve concomitant changes in both the level of aspirations and the types of aspirations that are held. In some cases the wide discrepancies between aspiration and achievement occur because new levels of aspiration may develop before the group has acquired both the internal and external resources sufficient to achieve these aspirations. In other cases more artificial barriers such as color of skin or caste considerations may be the cause of large and keenly felt discrepancies. Whatever the reason in the specific instance we need to know more about the dynamic psychological processes accompanying this phenomenon. The reactions to meaningful discrepancies in social life will have implications for such matters as political developments and rates of economic growth as well as for the mental health of populations.

References

1. Atkinson, J. W. 1957. Motivational determinants of risk-taking behavior. Psychol. Rev. **64**(6): 359–372.

2. Atkinson, J. W. 1960. The achievement motive, goal-setting, and probability preferences. J. Abnormal Soc. Psychol. **60:** 27–37.
3. Clausen, J. A. & M. L. Kohn. 1959. Relation of schizophrenia to the social structure of a small city. *In* B. Pasamanick, Epidemiology of Mental Disorder. Am. Assoc. Advancement Sci. Publ. Washington, D.C. **60:** 69–95.
4. Hollingshead, A. B. & F. C. Redlich. 1958. Social Class and Mental Illness: A Community Study. Wiley. New York, N.Y.
5. Kleiner, R. J. & S. Parker. 1959. Migration and mental illness: a new look. Am. Sociol. Rev. **24**(5)**:** 687–690.
6. Kleiner, R. J. 1959. Status, group membership, and schizophrenia. Symposium presentation. Am. Psychol. Assoc. Convention. Cincinnati, Ohio.
7. Kleiner, R. J., J. Tuckman & M. Lavell. 1959. Mental disorder and status based on religious affiliation. Human Relations. **12**(3)**:** 273–276.
8. Kleiner, R. J., J. Tuckman & M. Lavell. Mental disorder and status based on race. Psychiatry. In press.
9. Kleiner, R. J., J. Tuckman & M. Lavell. Mental disorder and status based on protestant subgroup membership. Psychiatry. Submitted for publication.
10. Lapouse, R., M. A. Monk & M. Terris. 1956. The drift hypothesis and socioeconomic differentials in schizophrenia. Am. J. Public Health. **46:** 979–986.
11. Lewin, K. 1936. Psychology of success and failure. Occupations. **14:** 926–930.
12. Lewin, K., L. Festniger & P. S. Sears. 1944. Level of aspiration. J. McV. Hunt, Ed. *In* Personality and the Behavior Disorders. : 431–466. Ronald Press. New York, N.Y.
13. Malzberg, B. & E. S. Lee. 1956. Migration and Mental Disease. Social Science Research Council. New York, N.Y.
14. McClelland, D. C., J. W. Atkinson, R. A. Clark & E. L. Lowell. 1953. The Achievement Motive. Appleton-Century-Crofts. New York, N.Y.
15. Odegaard, O. 1932. Emigration and insanity, a study of mental disease among the Norwegian born population of Minnesota. Acta Psychiat. et Neurol. Suppl. 4. Copenhagen, Denmark.
16. Odegaard, O. 1945. The distribution of mental disease in Norway: a contribution to the ecology of mental disorder. Acta Psychiat. et Neurol. **20:** 247–284.
17. Pasamanick, B., D. W. Roberts, P. W. Lemkau & D. B. Krueger. 1959. A survey of mental disease in an urban population: prevalency by race and income. *In* B. Pasamanick, Epidemiology of Mental Disorder. Am. Assoc. Advancement Sci. Publ. Washington, D.C. **60:** 183–203.
18. Tietze, C., P. Lemkau & M. Cooper. 1942. Personality disorder and spatial mobility. Am. J. Sociol. **48:** 29–39.
19. Tuckman, J. & R. J. Kleiner. Occupation, education, and schizophrenia. In preparation.

AN INTERDISCIPLINARY APPROACH TO PUBLIC HEALTH ON THE NAVAJO INDIAN RESERVATION: MEDICAL AND ANTHROPOLOGICAL ASPECTS*

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KURT DEUSCHLE: If we in the United States expect to conduct successful and effective technical aid programs in the health field, we must learn a great deal more about what aspects of Western medicine can be presented to people living in economically underdeveloped areas of the world so that greater good than harm results. No technical aid program must be approached with greater caution and sensitivity than crosscultural health work for, obviously, abrupt changes in health practices may be disastrous to a particular society. It is recognized that much more research is required to combine the medical and behavioral sciences in studying the innovation process whereby Western medicine is being applied in economically underdeveloped countries. Knowledge stemming from such research would be enormously useful to medical workers in international health programs.

In this paper the methods and results are presented whereby Western medicine has been applied to the needs of a Navajo Indian community in one such underdeveloped area of the United States. Studies on tuberculosis, coronary heart disease, and congenital hip disease are given as illustrations of the working relations between physicians, public health nurses, and anthropologists, and of the approach of this team to the community.

In July 1955 the Department of Public Health and Preventive Medicine of the Cornell University Medical College, New York, N.Y., undertook a research project in crosscultural health work among the Navajo Indians of the Southwestern United States (FIGURE 1). The project has provided our Department with technical aid experience in the health field. Only a brief description of the project will follow, as a full report has been published elsewhere.[1]

The site for this project, the Many Farms–Rough Rock area, is a geopolitical district in the center of the reservation (FIGURE 2). This area was chosen by the doctors and the anthropologist in close collaboration with the members of the Health Committee of the Navajo Tribal Council. The area extends 40 miles in its greatest east-west diameter and 20 miles north-south along the Chinle Valley in the central part of the Navajo country in Arizona.

It was estimated that there were 2000 Navajo living in this district. The

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† The authors have presented this paper in the form of a discussion to emphasize the cooperative endeavor of anthropology and medicine in this research project.

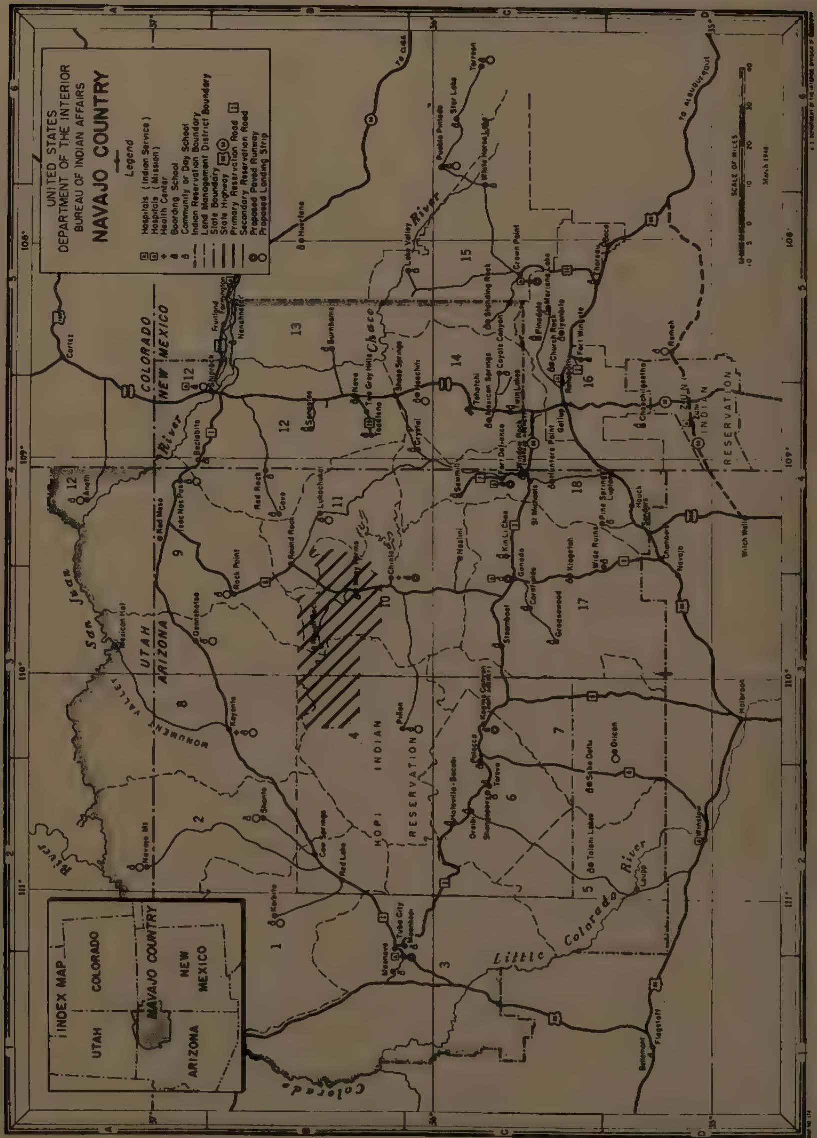

FIGURE 1. The Navajo reservation showing the Many Farms–Rough Rock research area.

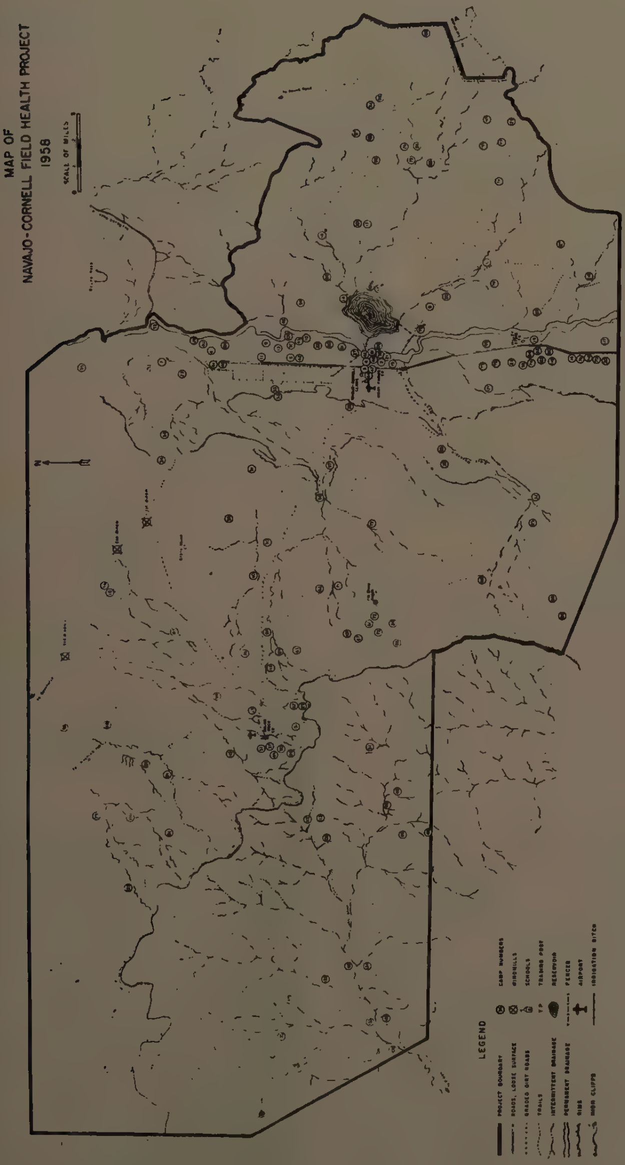

FIGURE 2. The Many Farms–Rough Rock area is a 600-square-mile district in the heart of the Navajo Indian reservation.

Tribe, the United States Public Health Service, and the University agreed that this community could serve as a representative sample of the Navajo population.

On December 31, 1959, five years after the Project was started, the total census of this community was 2126 persons (TABLE 1), of whom 50 per cent were under 20 years of age (FIGURE 3).

TABLE 1

MANY FARMS-ROUGH ROCK POPULATION VITAL STATISTICS 1955 TO 1959

Vital statistics	Calendar year				
	1955	1956	1957	1958	1959*
Population	1830	1895	1972	2047	2126
Census number of					
Live births	99	94	98	95	93*
Infant deaths	7	5	12	7	2
All deaths	13	12	21	16	7
Women age 15–44	405	417	417	421	426
Birth rate per 1000 population	54.1	53.8	49.7	46.4	43.7
Fertility rate per 1000 women age 15–44	244.4	224.1	230.6	225.6	218.3
Infant death rate per 1000 live births	70.7	53.2	122.4	73.6	21.5
Crude death rate per 1000 population	7.1	6.4	10.6	7.8	3.2

* 1959 is provisional until July 1, 1960. Population for 1960 = 2292.

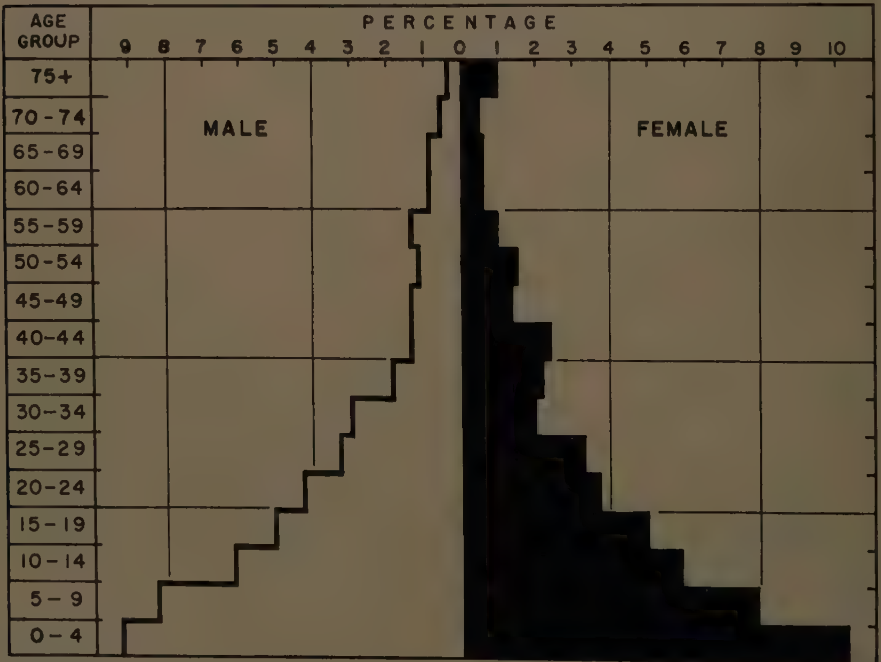

FIGURE 3. Many Farms–Rough Rock district population on Jan. 1, 1960, by age and sex percentages.

These people live in approximately 140 camps consisting of 2 to 6 dwellings (or hogans). An average of 3 related families reside in each camp, composing approximately 19 persons, with a range of 2 to 56 people.

Over the 5-year observation period the birth rate in this Navajo community was 49.5 per 1000: a rate twice that of the general United States population (TABLE 2).

The fertility rate defined as the number of live births per 1000 women aged 15 to 44 was 228.6. This is more than twice the national figure. The infant death rate was found to be 68.3 per 1000 births, which is 3 times the general United States rate. However, despite the high infant death rate the over-all crude death rate was 7.0 per 1000 population, which is actually considerably lower than the national rate of 9.4.

Thus the population growth in this community is an astounding 4 per cent: fully twice that of the United States population and even higher than that of Ceylon and India. If this percentage holds true of the Tribe as a whole (there is no reason to believe that it is substantially different) then the Navajos have a population growth of so-called explosive proportions. This is certainly a health "problem" akin to that of the underdeveloped countries.

TABLE 2

COMPARISON OF MANY FARMS–ROUGH ROCK POPULATION VITAL STATISTICS FIVE YEAR AVERAGE 1955 TO 1959 WITH GENERAL POPULATION OF NAVAJO RESERVATION, NEW MEXICO, AND U.S.A.

Vital statistics	Five-year averages			
	Many Farms–Rough Rock	Navajo Reservation	New Mexico	U.S.A.
Birth rate per 1000 population	49.5	37.4	34.2	24.6
Fertility rate per 1000 women age 15–44	228.6			
Infant death rate per 1000 live births	68.3	74.9	36.7	26.2
Crude death rate per 1000 population	7.0	7.3	7.2	9.4

The pattern of disease that emerged from the health studies to date is what one would expect from the pattern of living in the community. It was established that 76.3 per cent of the health problems were the result of microbial disease or the consequence of microbial disease. Infant diarrhea and pneumonia were the major causes of death (TABLE 3).

Gastroenteritis or diarrheal disorders were most commonly found in young children—70 per cent occurring in children less than 5 years of age. Although intestinal bacterial pathogens accounted for 10 to 15 per cent of these diarrheal illnesses, the etiology of the remainder is yet unexplained. A variety of respiratory infections, including tuberculosis, is a major cause of morbidity among the Navajo.

Considering the harsh environmental circumstances of the hogan situation, it is not surprising to find that respiratory and diarrheal disease are often followed by serious secondary complications. Other common illnesses include impetigo, anemia, gall bladder (stones) disease, and a strikingly high prevalence of congenital hip disease.

Diseases considered common in our society such as coronary heart disease, various metabolic and allergic disorders, and certain so-called stress diseases such as ulcerative colitis were observed rarely or not at all.

From the very beginning of our study a complete medical program was offered that included curative and preventive health services. The routine clinical work-up consisted of a complete history and physical examination, radiographs of the chest, standard laboratory studies, and 12-lead electrocardiograms on patients over 30 years of age.

The first specific disease problem—tuberculosis—will serve to illustrate the sequence of introducing modern medical technology across cultural barriers.

TABLE 3

PATTERN OF DISEASE IN THE FIRST 1600 PERSONS EXAMINED IN THREE YEARS AT MANY FARMS

Diagnosis	Percentage of total disease	
Almost entirely microbial		76.3
Respiratory diseases (pneumonia, influenza, and tuberculosis)	26.8	
Other microbial diseases (exclusive of tuberculosis and infant diarrhea)	19.0	
Sensory organs and nervous system (principally meningitis, deafness, and eye diseases, all resulting from infection)	15.5	
Diseases of digestive system (principally infant diarrhea and gall bladder disease)	8.6	
Disease of skin (principally infection)	6.4	
Anemia, congenital hip disease, accidents		11.3
Accidents	5.1	
Anemia and other blood disorders	3.4	
Diseases of bone (includes congenital disease of hip)	2.8	
Diseases common in U.S. society		4.0
Diseases of circulatory system (includes diseases of heart and vessels principally rheumatic fever)	2.2	
Allergic and endocrine and metabolic diseases (includes asthma and hyperthyroidism)	1.1	
Cancer	0.2	
Mental diseases	0.5	
Miscellaneous		8.4
Pregnancy, genitourinary diseases, and congenital malformations	8.4	
Total	100.0	100.0

Tuberculosis had been a leading cause of mortality and morbidity among the Navajo Indians for many years, hence the study of the prevalence and control of this affliction was high on the agenda of our research program.[2] Although an off-reservation hospitalization program and effective antituberculous chemotherapy had been available since 1952, satisfactory tuberculosis control on the reservation had not been achieved. It is of interest to review the completeness with which the Many Farms–Rough Rock tuberculosis studies were obtained.

It was possible to obtain chest films at the clinic on 90 per cent of the total project population. Five hundred and twenty children less than 12 years of age had chest films and complete clinical examinations, and 72 per cent had tuberculin tests. At the start of the project 33 per cent of the tuberculin-tested children had a positive test, denoting the presence of a tuberculous infection. This is at least 10 times the tuberculous infection rate of children of comparable age in most non-Indian communities.

In a special study* of a portion of the population the prevalence rate of tuberculosis among the 923 Navajos was 9 per cent for all forms of tuberculosis, 8.6 per cent for pulmonary tuberculosis (not including healed primary tuberculosis), 7 per cent for reinfection pulmonary tuberculosis clinically significant by radiographic examination, and 2.1 per cent for active reinfection pulmonary tuberculosis.

It was determined that the morbidity rate of tuberculosis in all forms was 135 per 1000 in camps where all children were tuberculin negative. Thus active reinfection pulmonary tuberculosis showed a comparative rate of 25 and 7, respectively. It was concluded that the tuberculin testing of school and preschool children provided an effective index method for determining the presence of tuberculous foci in the community. The tuberculosis treatment program on the project was essentially this:

In the past four years all the tuberculin positive school and preschool children have been treated prophylactically with the potent oral antituberculous chemotherapy—isoniazid—for periods of from 12 to 18 months. All forms of active or recently active tuberculosis have been given isoniazid on an ambulatory or field-program basis.

Approximately 40 patients of this type have been treated with isoniazid self-medication on the project. At the present time there are only two Navajos, one man and one woman, who have refused hospitalization for active infectious pulmonary tuberculosis; however, both of those individuals are faithfully taking isoniazid. During the life of the project not a single Navajo in the community has died of tuberculosis. Furthermore, the tuberculin positive rate has fallen from 33 per cent in the school-age group to 8 per cent—a fourfold drop in four years.

JOHN ADAIR: In working with this tuberculosis problem careful attention was given to the value system of the recipient society, especially in the area of health and religion, and by working out an effective communications system between the donor and recipient society. As far back as 1952 isoniazid was clinically tested on the Navajo Reservation at the Fort Defiance Sanitorium, Ft. Defiance, Ariz., by Cornell University investigators under the direction of Walsh McDermott. The effectiveness of this drug in cutting down hospitalization from years to months was perceived by the Navajo patients and their families, as well as by the tribal leaders who helped to support the research with their tribal health funds.

The questions that confronted the clinicians after these clinical tests had proven successful in the hospital were:

(1) Could this drug be used effectively in the native community and in the home to arrest disease before it reached an advanced stage? There in the natural environment, in contrast to the sanitorium, cultural factors would be of crucial importance in the acceptance or rejection of this new medical service.

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* Omran, A. R. "An Evaluation of Tuberculosis Case Finding in Areas with Underdeveloped Resources by Tuberculin Testing of Young Children" (in preparation).

(2) Could tuberculosis be brought under control where the program depended on self-medication by patients who spoke another language and had a totally different outlook on medicine: where, in fact, medicine was intricately interwoven with religion both in etiology and therapy?

In 1955 at the start of our Project one of the Navajo tribal leaders, who was also a medicine man, made a speech at a monthly meeting of doctors gathered at Fort Defiance. He said:

"There are some things which we medicine men know the white doctor is better able to cure than we, such as appendicitis and tuberculosis, we have given up on those.

"Then there are such things as snake bite, which both the medicine man and the doctor can cure, each using his own method. But there is still a third kind of illness which only the Navajo medicine man can cure—for example, a person might have lightning illness, caused by his being nearby when lightning struck.

"You white doctors wouldn't know that person is sick and so it wouldn't occur to you to treat that person. But, in the Navajo way of thinking, it is just as important to treat him as it is to treat the person in pain with appendicitis."

Only 20 years earlier, as reported by A. and D. Leighton,[3] the Navajo had resisted hospitalization. The change in behavior and attitude of the Navajo toward Western medicine may in a large part be accounted for by the great success of the antibiotics in combating contagious disease, starting in the early 1940s.

The Navajo are quick to pick up innovations that can be demonstrated to be practical in terms of their life-way. Indeed their value system supports this pragmatic outlook.

This pragmatism was again demonstrated at the organizing meeting at Many Farms eight months before the clinic was opened. The first Navajo to be recruited to the staff was a discharged patient of one of us (K.D.) from the Fort Defiance Sanitorium, who told how isoniazid had saved his life.

The proposed program of using it on a home-treatment basis gained further support at that same meeting from other members of the community and from Annie Wauneka, the chairman of the Tribal Health Committee, all of whom had seen their relatives return home from sanitoria cured of the disease. Such testimony did more to gain Navajo confidence than would any amount of education about the germ theory, which is beyond the scope of their education and belief system.

From the very start the medicine men in the community were co-operative. At the dedication of the clinic a political leader in the area, who was also a medicine man, sang house-blessing songs from one of the Navajo sacred ceremonies. In interviews conducted by the anthropologist a few months later with medicine men they assured him that they and the doctors were "going along parallel paths, each seeking for the health of the patient."

Ambulatory care for tuberculosis would take place at home where the patient would have the psychological support of his family and within reach of the medicine man if he was needed. Thus the curative properties of the drug were reinforced by the traditions of the people, rather than set in opposition to them. However, from the medical point of view it was deemed necessary to hospitalize advanced cases of the disease.

There remained the problem of designing a service in which there would be effective communication between the doctor and the patient, between the clinic and the home, and between the clinic and the community. None of the donor group spoke the language of the recipients, and only a small number of the Navajo were competent in English. No matter how well designed the program was in terms of valued goals of both the doctor and his patients it could only be as successful as the communication system that was established between the total medical team and the Navajo Community.

This communication problem was met primarily through two means: (1) by designing an effective medical record system that reflected the social organization of the community,* and (2) by designing a system of communication with the patients and their families through acculturated Navajo bilinguals.[4-6]

As to the records the ascending number system used on the Navajo Reservation and elsewhere throughout the United States in hospitals and clinics was totally inadequate in this research and service program. It was redesigned by the resident anthropologist, Donald Rieder, working with the public health nurse, Bernice Loughlin, so that each patient was seen in the social context of his immediate family; in turn the records of this conjugal family were placed in the files next to those of other hogan groups that made up the camp (roughly speaking, that part of the extended family living in adjacent hogans). This system worked very well, and once established was a means whereby the young inexperienced physician was encouraged to think in terms of the family context of disease.

The second means of effective communication, the human agency of diffusion, was a small group of Navajo men and women, eight in all, who were trained on this pilot program as assistants to the doctors in the clinic and to the nurses in the field. These assistants, whom we call *health visitors* (FIGURE 4), were all trained in the basic concepts of health and disease over a period of six months or more before they contacted patients in hogans. Along with their basic background in the concepts of such matters as anatomy, physiology, and disease contagion, they worked as interpreters in the clinic where they had their first contacts with patients.

In the clinic (FIGURE 5) the health visitor takes the history of the presenting complaint orally in Navajo, and writes answers in English to specific questions on a form. (It is to be remembered that only a small number of Navajo over 50 years of age speak English with confidence, and most patients 20 years or older prefer to speak their native tongue in the clinic.)

A frequent complaint of doctors is that practicing medicine with the Navajo is like "practicing veterinary medicine." There is not only no direct verbal exchange but a minimum of facial expression and gesture; additionally it is sometimes difficult for the doctor to get an adequate history of pain, of crucial importance in the diagnosis of many diseases.

As these trainees gained skill they were able to break down a good part of this barrier so that a more natural doctor-patient relationship could develop. This was possible because of the intermediate cultural position of the health visitor, who shared many of the values, beliefs, and habitual behavior of the patient on the one hand and those of the doctor on the other.

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* Rieder, D., and Loughlin, B. "Medical Records in Cross-cultural Health Research" (in preparation).

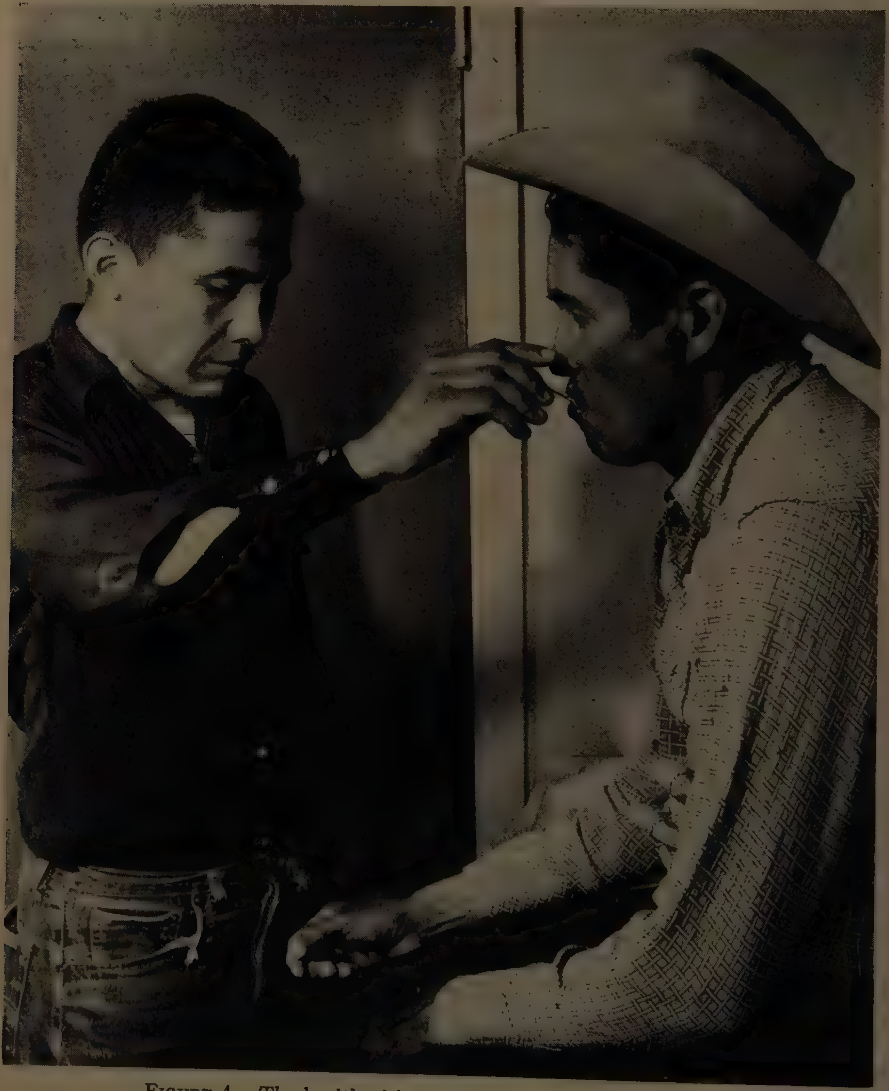

FIGURE 4. The health visitor takes a patient's temperature.

Although the greater number of these health visitors had been cured of tuberculosis they also retained much of their Navajo religious belief and participated in curing ceremonies for members of their own families. Their understanding and sympathy as well as their technical nursing skills were ap-

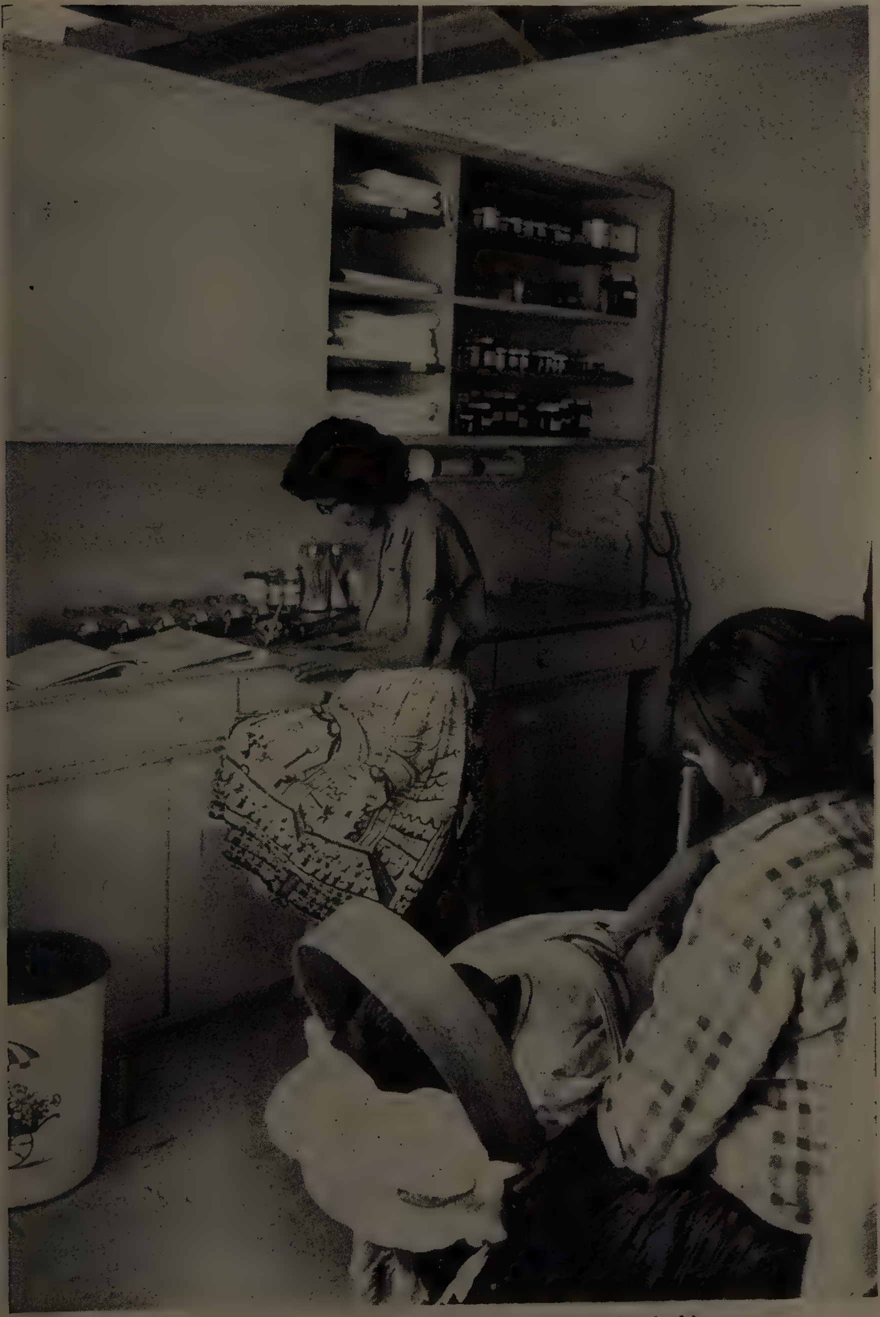

FIGURE 5. The health visitor helps to obtain a patient's history.

preciated by the patients. On the other hand the health visitor could also communicate more effectively with the doctor and nurse in English, now that he had been trained in basic medical concepts.

This role of interpreter and doctors' assistant was well established before the health visitors started to go out to the hogans under the supervision of the public health nurses, where they distributed the isoniazid and explained why it was important to take the pills regularly; they also administered tuberculin tests, conveyed word from the doctor to the families of patients concerning need for a clinic visit, or the results of a laboratory procedure (FIGURE 6). Likewise they reported on progress in the hogan to the public health nurse, who supervised their work. Radio-telephones in the health visitors' cars, with a central station at the clinic, facilitated supervision and minimized situations that were conducive to the health visitors making a diagnosis. They relayed signs and symptoms back to the nurse and doctor.

FIGURE 6. The health visitor makes a follow-up call in a Navajo home.

While their role in the clinic had historical precedence in other reservation hospitals and clinics, their work with patients in the hogan was an innovation. Navajo interpersonal relations are traditionally patterned by kin and clan relations. Thus the health visitor with the most relatives in the area was the first to render good service by modern nursing standards.

The health visitors became an effective agency of communication. Self-medication was carried out successfully, using the health visitors as the link between clinic and home and between doctor and patient. This enabled the patient to derive the medical benefits of tuberculosis chemotherapy in the home environment where his psychological and religious needs could be looked after by his family and the medicine man.

To summarize: tuberculosis therapy was the entering wedge in setting up a successful medical program in this community. Through effective use of the drug in the home the doctors gained the confidence of the Navajo in the community, just as they had previously gained the tribe's confidence in the hospital program prior to the field program.

The health visitors shared in this success and became trusted by the community as members of the medical team. This also enabled the medical team to reach out to the home and gather demographic information that could not have been obtained by other means, especially mortality data, which is most difficult to obtain from the Navajo Indians.

Because the health visitors assisted the doctors in the clinic and the public health nurses in the field, they were able to observe the same patients in both environments. This also served to give the patients a unified picture of preventive and curative medicine, services that are too often separated in total health practice on the Navajo reservation and elsewhere, much to the confusion of patients. The benefits of curative medicine were used to build up confidence in aspects of preventive service, especially in maternal and child health.

In this program, as on successful technical aid programs overseas, the participation of the people themselves in the carrying out of the program was of great importance in structuring effective relations between the innovators and the community. This participation was not limited to the health visitors: the clinic was staffed with Navajo in many capacities: clerks, X-ray laboratory assistant (FIGURE 7), teacher-interpreter (who assisted in the training of the health visitors), research assistants to the anthropologist and nursing staff, and maintenance personnel. This gave the community a vested interest in the program.

In the tuberculosis phase of the total program both the physician and the anthropologist were concerned with application; the basic medical facts (and technology) were at hand as was the basic anthropologic information about Navajo society and culture. The objective of the collaboration was to design a medical service that would be compatible with Navajo values and carry out principles of innovation and administration across a language and culture barrier.

However, in coronary heart disease research* each profession was seeking

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* Fulmer, H., Deuschle, K., Dobyns, C. R., Schwartz, M., McDermott, W. "Coronary Heart Disease among the Navajo" (in preparation).

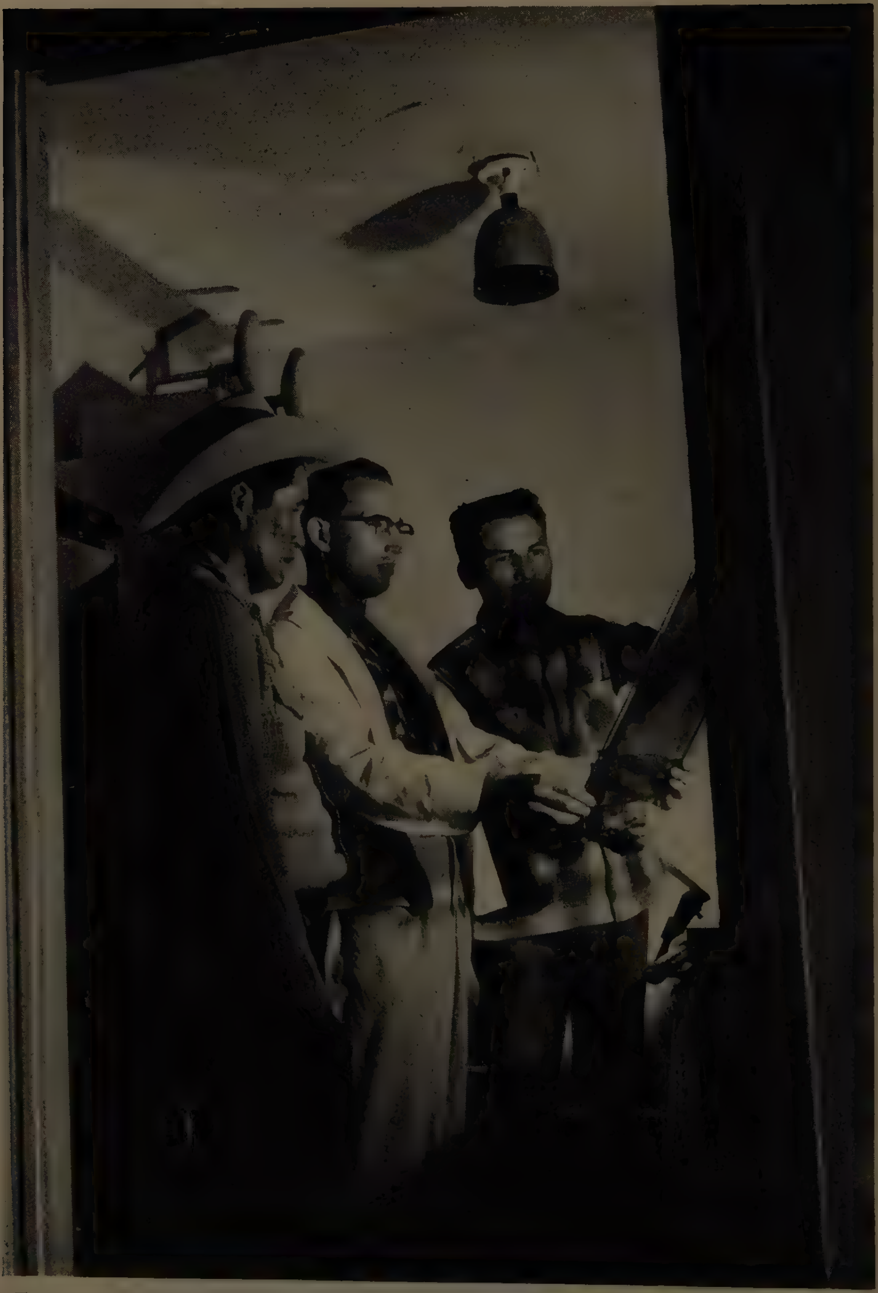

FIGURE 7. Physician and Navajo X-ray technician show a patient his chest film.

basic information and could not rely on the feedback of effective service to the community with respect to heart disease. This medical "segmental study" was carried on within the context of the comprehensive clinic service in curative and preventive medicine. It has been our experience that in crosscultural medicine research that requires a high level of rapport in order to get accurate medical information must follow effective medical service if valid results are to be obtained.

DEUSCHLE: Unlike tuberculosis, heart disease has a very low incidence, but it might increase as the population ages and more Navajos become acculturated to Western civilization.

Coronary heart disease is thought to be culture-linked, and the factor most highly suspected is the amount of animal fat in the diet. What people really eat is quite difficult to determine in one's own culture, and to study it in an alien culture, especially in primitive societies, becomes extraordinarily complicated. In these circumstances only a relatively small population can be studied in the necessary detail; hence such studies must be conducted for long periods of time.

In addition to the routine studies, roentgenographs, electrocardiograms, and serum cholesterols had been collected from a substantial majority of the study population since the opening of the clinic.

Diet studies consisted of direct observation of food consumption in Navajo families by the resident anthropologist, Cara Richards Dobyns, and her Navajo assistant over a year's period; thus seasonal variations were noted. Chemical analysis of typical Navajo menus and determination* of fatty-acid composition of selected fat biopsies on Navajo men were obtained.

Additionally observations were made by the anthropologist on sleeping habits, smoking, and physical activities of the people. The medical team obtained urinary ketosteroid excretion patterns that required collection and analysis of 24 hour urine specimens.†

Diet studies now completed show a monotonous but adequate diet that is probably lower in animal fat than the average diet in the United States. In four years the prevalence and incidence studies still in progress show two deaths in a total of three persons with coronary heart disease. Only one death occurred in the male population (TABLE 3).

These data compared with a coronary heart disease study in a white urban population at Framingham, Mass., indicate low rates, which on analysis are significant (TABLE 4).

Research in such depth within a whole community as presented here could not have been accomplished as an independent research operation, but no great problems arose when studies were interlaced with the medical service, which was highly prized by the community.

ADAIR: The third illustration is that of congenital hip dislocation. This disease problem had to be approached with great caution, for when investigation of this disease was suggested our own Navajo staff showed marked resistance to the program, which in part may have resulted from religious sanctions.

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* The determination of the fatty acid composition of the adipose tissue was done by Jules Hirsch at the Rockefeller Institute, New York, N.Y.

† The determinations of the patterns of urinary excretion of ketosteroids are being performed by Thomas F. Gallagher and his co-workers at the Sloan-Kettering Division of Cornell University Graduate School.

Congenital hip dislocation was seen in 27 of 2200 people on routine physical examinations. The prevalence rate of this crippling condition is more than 1000 per 100,000 in contrast to the New York City rate of 3.8 per 100,000 population.

Several of the members of our Navajo staff had relatives with congenital hip dislocation, and indeed a "surgical failure" in one of the children that later resulted in fusion of the hip joint heightened the mistrust for the scientific cure for this disease. This child with the fused hip had great difficulty in getting up and down to family meals that were served on the hogan floor, or to mount a horse and ride it comfortably. Thus from first-hand experience with congenital hip disease and surgical failure, our Navajo staff was disaffected by what modern medicine had to offer.

Actually the nonsurgical approach to correction of the congenital dislocation can be accomplished during the first and even second year of life. However, during the third and fourth year the only satisfactory form of therapy is surgical correction of the hip dislocation. After four or five years of age the surgical approaches become more complicated and risk of "failure" increases. It is with the older children that the operative procedures had developed a "bad reputation" among the Navajos. Unfortunately many of the Navajo children with the congenital hip disorder were not brought to a physician until the optimum period for surgical correction had passed.

Table 4

Comparison of Coronary Heart Disease in Navajo and Framingham Males

Population*	Presence of disease	Absence of disease	Rate per 1000
Navajo (125)	1	124	8.0
Framingham (1976)	65	1911	32.9

* Complete medical examination and electrocardiogram.

In effect from the Navajo point of view a public health problem was brought about by the lack of success in surgical treatment. From the medical point of view, however, other approaches to therapy were indicated because of secondary complications in later life causing arthritis.

This has led to the planning of other programs that offered alternatives to surgery. These have been made possible by the drawing together of clinical data that showed the incidence and occurrence of this hip disease and genealogic material worked up by the resident anthropologist and a medical student. Now the disease may be seen as it has been transmitted through matrilineal family lines.

Early examinations of infants, especially those born of women from clans with a high incidence of the disease, may lead to a preventive orthopedic program.

If it proves practical from the point of view of the orthopedic surgeon, the Navajo cradleboard, which at present may aggravate the disease, might be modified so the legs of infants with the disease are strapped in a flexed rather than in an extended position. Thus deep-seated child rearing habits will not have to be drastically altered.

A second phase of the congenital hip studies, only now getting underway, involves genetic research, and will be carried out by Alexander Bearne of the Rockefeller Institute, New York, N.Y. Bearne will use sera collected from affected families in an endeavor to study the genetic aspects of the disorder.

In summary it may be noted that a considerable research "yield" has been obtained by the intimate cooperation and collaboration of the medical and the behavioral science team. Through this joint effort the broad and the specific objectives of this crosscultural field health work have either already been achieved or will be completed in the near future.

Demographic information and health statistics on mortality and morbidity hitherto only estimated on the Navajo Indian Reservation as a whole have been determined precisely for a defined Navajo community.

The reduction of disease in this community has been in a large measure due to its over-all design. The selection of a community of approximately 2000 Navajos has enabled us to obtain detailed clinical and field observations over a period of years on the whole spectrum of disease: a holistic approach compatible with anthropologic tradition. Close collaboration with public health nurses and anthropologists has enabled the physician to see and treat disease in its larger setting of the family, community, and tribe.

Three illustrations of crosscultural health have been reviewed in some detail as specific examples of what can be accomplished when the interdisciplinary approach to public health is carried out. Beginning with tuberculosis, a disease problem that Navajos recognized as a serious health hazard, the medical team introduced modern medicine successfully despite enormous cultural and language barriers.

Following this medical service that was highly prized by the community, research in a disease area of low incidence—coronary heart disease—and a disease area cloaked with religious sanctions as well as resistance due to surgical failure—congenital hip disease—have been investigated without serious difficulties.

We have been careful to work through the political and social organization; we have paid close attention to Navajo values, especially in the area of native religion and medicine. Additionally we have worked out an effective communications system through bilinguals, and we have given the Navajo confidence in his own abilities by involving him as a member of the innovating medical team.

This has resulted in close rapport with this Navajo "community," and has enabled the medical team to carry on sensitive medical research and derive reliable results that would not have been possible otherwise.

Inasmuch as the Navajo Indians represent a miniature of the health problems seen in economically underdeveloped areas of the world, the findings described here may be useful to medical workers in some of our international health programs.

References

1. McDermott, W., K. Deuschle, J. Adair, H. Fulmer & B. Loughlin. 1960. Introducing modern medicine in a Navajo community. Science. **131**(3395 & 3396).
2. Deuschle, K. 1959. Tuberculosis among the Navajo. Am. Rev. Respiratory Diseases. **80**(2).
3. Leighton, A. & D. Leighton. 1944. The Navajo Door. Harvard Univ. Press. Cambridge, Mass.
4. Loughlin, B. & E. Mansell. 1959. Training health workers on the Navajo Indian reservation. Nursing Times. (Jan.).
5. Adair, J. 1960. The Indian health worker in the Cornell-Navaho project. Human Organization. **19**(2).
6. Mansell, E. & B. Loughlin. 1958. The Navajo health visitor. Practical Nursing. (April).

Discussion of the Paper

EDWARD WELLIN (*American Public Health Association, New York, N.Y.*): As a contribution to interdisciplinary and intercultural problems in public health, the Deuschle-Adair paper provides some answers and raises some questions. My comments relate to two of the questions and deal essentially with possible lines of further research suggested by the Deuschle-Adair presentation.

Interrelationship of Population Growth, Health Levels, and Cultural Change

Deuschle and Adair point to a high rate of population growth in the Many Farms–Rough Rock area and suggest that a population explosion may be occurring there and among the Navajo in general. I assume that the growth rate is not simply an artifact of records but is a real phenomenon and one that can be confirmed by continued observations.

Anthropologists have been interested, although not as much as they ought to be, in the cultural factors associated with population dynamics. In general the literature deals with the concomitants of *depopulation*, that is, what happens to the sociocultural system when processes of population loss result in reduced supplies of incumbents for the society's system of roles. Of course, until recent years a typical consequence of cultural contact with modern societies for nonliterate cultures was diminution of native populations.

Deuschle and Adair's material indicates that an opportunity has developed for studying in scope and depth the interplay of natural increase of population in a Navajo group with factors not only of culture but health as well. Indeed the Many Farms–Rough Rock area may constitute an unusually good natural laboratory—one perhaps unequaled anywhere else in the world—to study these interrelationships in detail, breadth, and in time-depth as well as at various levels of abstraction.

The population—about 2300—is small enough to be studied intensively and for long periods, and large enough to provide useful series and group data. The interdisciplinary approach appears to be sufficiently well established on the project to permit physician, geneticist, demographer, anthropologist, and other specialists to work together fruitfully. Also, for few peoples anywhere is the ethnographic record more adequate than for the Navajo.

If it is valid that studies in small societies provide insights and generate hypotheses applicable to the study of larger and more complex groups, investigation of the dynamics and interrelationships of population, culture, and public health in the Many Farms–Rough Rock area should be of value far beyond the Navajo boundaries.

The Health Visitors

A group of specially trained Navajo men and women—the health visitors—serve as intermediaries between English-speaking medical and paramedical personnel and Navajo patients. This is an example of the creation of a new role and its insertion into three ongoing and somewhat different systems of roles.

Relative to health or service personnel, how does the health visitor fit in? Naturally I refer to the whole span of relationships, not simply those formalized in the table of organization.

Relative to research personnel (anthropologists and others): how is the health visitor perceived and used? Without straining, one can visualize situations in which health personnel want to use the health visitor's services primarily in a service capacity, and research people want to utilize his or her research potential. Do such conflicts arise? If so, how are they resolved?

Relative to the Navajo community, how are the statuses and activities of the health visitor perceived? What problems are solved and what dilemmas or conflicts are produced when an individual works as a health visitor in the community?

However the health team defines his job, how does the health visitor define or redefine it? What conflicts occur for a health visitor in attempting to fulfill the expectations of the health team and those of the community?

Granted that the interposition of the health visitor facilitates communication between professional health worker and Navajo patient, I still hope that Deuschle and Adair can give deeper attention to studying the processes of communication in the total network of roles in which health visitors are implicated.

NATIVE ENDOWMENT AND MENTAL HEALTH AND ILLNESS: A CROSSCULTURAL PERSPECTIVE

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When anthropologists first began to study the range of personalities occurring in any given culture, the individual who did not conform to the norm, in the sense that he did not internalize the central values of his culture, was described as the deviant. There was no necessary implication of psychiatric abnormality. Rather, his dilemma was phrased as being born in a society whose culture was "not congenial to his temperament" much as the humanists speak of a man born out of his time.[1] Mead specifically described the consequences of an overly rigid cultural ascription of characteristics to men and women that ignored the range of biological variability found in any human population in both sexes.[2]

With the growth of the culture-personality field, and the adaptation of techniques such as projective tests to crosscultural investigation, supplemented by such life-history data as the ethnologist is able to obtain, studies have fallen into four major categories: (1) description of adult-character structure and the processes of socialization in a succeeding generation; (2) studies of the range of personality variation within a culture both for adults and children; (3) changes of patterns of the external culture with stability of the personality organization; and (4) changes in the external culture with concomitant changes in the personality organization.

However, in any group that the anthropologist studies, no matter how small, there is a range of variability in the human organism—a potential in the neonate, manifested sometimes in the adult—that is ordinarily summed up in the term human capacities. Like the human personality, which is an emergent dependent upon human speech and culture, human potentialities are dependent for their realization upon the levels of development of the culture into which one is born.

There seems to be no reason to assume that there is less variability on an organic basis in any human group the anthropologist studies than that described by Nissen for 57 chimpanzees.[3] Nevertheless the complex processes of growth and socialization tend to mask the extent of individual variability except in extreme cases. Most field workers who have had the opportunity to spend any extended period in a preliterate society are well aware of the range of individuality but do not report it when it has not been the central problem of their field research.

Since the available formulations of personality development, the techniques for investigating it, and the vocabulary for describing it are derived from the study of the psychiatrically ill, a clinical flavor is inevitably imparted to the material elicited in studies employing them.

In a study by M. E. Spiro of mental illness in Ifaluk,* details of interview and behavior are provided of one neurotic and two psychotic men of the

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* An atoll in the Central Caroline Islands of Micronesia, with a population of 250.

10 individuals regarded by the local populace as *malebush*, that is, mentally deficient or ill.[4] The socialization processes generate high levels of hostility and anxiety that are projected upon ghosts. This affects the entire population, and is manifested in compulsive sociability and the daily consumption of toddy. That the difficulties of the two psychotics were triggered by brutal treatment in Japanese labor gangs helps to define the problem, since other men were subjected to the same treatment but did not break down. Spiro's analysis of the neurotic who did not experience forced labor, who is not hostile, but is insecure and self-isolated but cognitively intact, helps to highlight the problem with which this paper is concerned. In Ifaluk the parent, as a parent, is the source of insecurity, but the chiefs play the role of benevolent father figures, serving to reduce insecurity. Since the neurotic is the son of a deceased paramount chief, the culturally provided means of reducing insecurity do not function. However, when Spiro first describes Vegoilep—the one neurotic man whose case is analyzed in detail—he uses these words: "He is a male approximately forty years old, and the only bachelor in Ifaluk . . . . He has sorrowful eyes and long slender fingers. His features are very feminine, and his body is soft and flabby." This at least suggests that his native organic endowment may be a factor of some significance even though none of his difficulties is ascribed to it in the interpretation.

The Taita (Wataita) are a Bantu-speaking hill tribe numbering about 53,000, located in the Coast Province of Kenya, East Africa. In an analysis of the form of spirit possession (called *saka* in the local language) institutionalized among the married women, Grace Harris noted that their everyday behavior varied from mousy shyness to blustering aggressiveness, from habitual affability to sardonic cantankerousness.[5] Some of the attacks of *saka* were set off by genuine anxiety, but in other attacks women seemed to be pretending quite deliberately. On the level of tensions, attitudes, and feelings, *saka* may be many things to many women. Some may be severely neurotic, but this is doubtful of most of them. It is precisely the everyday behavior described as characteristically shy, aggressive, or affable that needs elucidation. Culturally, *saka* is a female affliction, manifesting women's protests at lack of property, but G. Harris witnessed three such attacks in males who all struck her as definitely odd personalities.

Studies such as that by Y. A. Cohen of the Rocky Roads community in Jamaica, the West Indies, may be taken as a type that gives us the patterned experience of children and the subsequent form of the social character of the adults.[6] Among the 277 individuals in 57 households, only two senile old women were psychotic. However, the adult character is psychologically isolated, suspicious, and seeks security in amassing money. We are given no picture of the range of individual variation within the pattern for either children or adults, but that was not the problem with which Cohen was concerned.

Since most of the groups studied by anthropologists have high death rates, particularly in infancy, it is probable that many of the deficiencies and anomalies that survive under modern conditions are not represented in their population. Nevertheless, most of the overt behavior associated with psychiatric syndromes occurs frequently regardless of the cultural coloring, the ways of handling such behavior, and the native interpretation of it. Any group available for study has also met the minimum requirements of survival and capacity to produce the next generation.

Concepts of disease are as old as man. Concepts of health are relatively recent emergents, at least when they are stated in other than negative terms. Formulation of the components of positive mental health have been difficult to reach, since the personality processes are distinguished by degree or pervasiveness rather than by kind. Nevertheless, two attempts to define the optima are remarkably similar, and both involve a balance among three elements. Smith[7] lists adaptive adjustment, personal integration, and cognitive adequacy as essential in any optima of mental health. Jahoda[8] lists mastery or adjustment, unity of the personality, and ability to perceive oneself and the world correctly. Maslow[9] has attempted to find persons who fit reasonably well his criteria of health and to describe their characteristics in terms of self-actualization. This concept seems to imply a degree of uniqueness characteristic of each individual that hardly seems realizable under most of the conditions of human life that are known. Nevertheless it finds an echo in the following remark of Hans Selye:[10] "There is something compulsive, something strictly obligatory even in our 'voluntary activities' . . . what is in us must express itself at a speed and in directions predetermined by our own inherited structure." A geneticist writes, "Each individual has a unique assembly of genes and will have his own mode of reaction to disease, whether it be presented through infection, trauma, stress, or malnutrition, or wholly from within through biochemical error."[11]

Given the range of variability in any population, then, we can modify our way of looking at the process of maturation and enculturation. From the point of view of the society the process is one of molding, but from the point of view of the receiving and reacting organism it is a process of filtering experience. It is probably this process that is responsible for the ethnographer's recognition of familiar personality types in quite diverse cultures.

Since in any group studied one would expect significant variations in gross body size and strength, stamina, endocrine balance, tissue sensitivity, maturation rate, and other factors, the role of these factors can be better ascertained in studies conducted in contemporary society with its facilities of hospitals, nurseries, clinics, and schools, and the opportunity to continue observations of series of individuals over long periods of time. Even in so well-studied a culture as the Navajo, where the Harvard group has records in some communities of families covering more than 30 years, it is likely that emotional problems are handled in a traditional setting and that only some forms of physical illness are brought to the hospital.

Cultural data from primitive societies are more likely to be illuminating in indicating recurrent stress points in the life cycle of the man or woman associated with matrilocal or patrilocal residence after marriage or with other changes of status, whether marked by *rites de passage* or not. However, without some information on the degree of anxiety evoked, its duration, and its resolution in a sample of individuals, it remains a normative statement divorced from experience. The difficulties of trying to utilize extant ethnographic literature have been mentioned by Wallace,[12] who pointed out that source material may be complete about subsistence and social structure but deficient in respect to some specific interest. It has been customary to regard any culture as a set of solutions to the universal problems of human life, but it is also possible to view those solutions as more or less adequate for some, if not all, members of the society.

All over the world change is the order of the day. Traditional patterns of culture are being modified at varying rates of speed and with differing consequences to the health of the populations concerned. The dilemma of the Indians of the altiplano in Peru, squeezed off the land in the highlands by population pressure and technological changes and seeking work in the coastal cities, is manifested in multiple forms of illness: malnutrition, alcoholism, and a variety of physical, psychological, and psychosomatic diseases.[13] Hopefully, in some areas the more damaging and disruptive effects of cultural change may be ameliorated and practices may be directed; it sometimes happens that for some individuals changed conditions provide opportunities for more effective roles than were available to those of an earlier generation. Barring cataclysmic change it is the variability in endowment and life experience among its population that enables most groups to assimilate new practices and adjust to new conditions.

It may well be that the conception of mental health in positive terms is a Utopian one. However, it should not be impossible to find some subjects who have a relatively stable hierarchy of values, who can tolerate essential frustration and ambiguity, whose defenses work reasonably well, and who attain some of the goals they have made their own. Conceivably they could be men of action, scholars, career women, or housewives. Research strategy suggests that the search for such individuals is more likely to be rewarding in contemporary society. Should such subjects be found in the course of ethnological field work, the investigator may consider himself fortunate, but it is improbable that research could be based upon the assumption that they would be located.

References

1. Benedict, R. 1934. Patterns of Culture. Houghton Mifflin. Boston, Mass.
2. Mead, M. 1935. Sex and Temperament in Three Primitive Societies. William Morrow. New York, N. Y.
3. Nissen, H. W. 1957. Individuality in the behavior of chimpanzees. Am. Anthropologist. **58:** 407–413.
4. Spiro, M. E. 1959. Cultural heritage, personal tensions, and mental illness in a south sea culture. *In* Culture and Mental Health. : 141–171. M. K. Opler, Ed. Macmillan. New York, N. Y.
5. Harris, G. 1957. Possession "hysteria" in a Kenya tribe. Am. Anthropologist. **59:** 1046–1066.
6. Cohen, Y. A. 1955. Character formation and social structure in a Jamaican community. Psychiatry. **18:** 275–296.
7. Smith, M. B. 1950. Optima of mental health. Psychiatry. **13:** 503–510.
8. Jahoda, M. 1955. Toward a social psychology of mental health. *In* Mental Health and Mental Disorder. : 556–577. A. Rose, Ed. Norton. New York, N. Y.
9. Maslow, A. 1954. Motivation and Personality. : 199–234. Harpers. New York, N. Y.

10. Selye, H. 1956. The Stress of Life. : 278. McGraw-Hill. New York, N. Y.
11. Snyder, L. H. 1959. Fifty years of medical genetics. Science. **129:** 7–15.
12. Wallace, A. F. C. 1959. Cultural determinants of response to hallucinatory experience. A. M. A. Arch. Gen. Psychiat. **1:** 58–69.
13. Fried, J. 1959. Acculturation and mental health among Indian migrants in Peru. *In* Culture and Mental Health. : 119–137. M. K. Opler, Ed. Macmillan. New York, N. Y.

MENTAL HEALTH AND MIGRATION TO CITIES: A PERUVIAN CASE*

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Large-scale internal migration in Peru is not a new phenomenon. Kubler[1] and others have commented on migration in Inca and Colonial times. Migration from the provinces to Lima is of long standing and has largely accounted for the growth of the city. García Frías[2] pointed out the extent of migration in and out of Lima in 1940, and the most casual observer in Lima today can note the large numbers of migrants arriving daily from the provinces. The migrants include people from all social classes, all types of settlements, and all regions, and are found in all sections of Lima. The few white upper-class migrants from the large haciendas and towns of the provinces are generally quite familiar with Lima and Lima culture before they migrate and therefore have little difficulty in adjusting. In many cases they are quite involved in extended families which maintain Lima residences as well as provincial ones. The small kinship-oriented upper class of Peru controls the vast majority of the wealth of the country but is relatively unimportant in terms of migration. Another group that, until the last few years, figured somewhat less in migration than others is the conservative Indian group,[3,4] that is, the people characterized by Quechua speaking, coca chewing, trial marriage, remnants of patrilineal ancestry, and homespun Indian clothing, and who generally migrate to a provincial city, a mine, or a hacienda for a number of years, even a generation, before coming to Lima.

The bulk of the migrants are mestizos, Cholos (progressive Indians who have left Indian communities and are participating in national Peruvian culture, generally a one-generation transitional group), and those who, for lack of a better term, I shall call modern provincial Peruvians. The Cholos are mostly bilingual mountaineers, but so are many of the mestizos and the modern Peruvians. As Simmons noted[5] there are two ideal types in Peru, the coastal-urban-creole (or modern Peruvian) and the mountain-rural-Indian, but there is considerable intermixture of the categories in actual fact. The dominant high-status culture pattern in Lima is certainly the urban, modern Peruvian.

Some current (and ancient) writings in social science would lead us to expect that the low-status migrants whose culture differs most from that of the dominant group will suffer severe stress and exhibit disorganized and maladaptive behavior supposedly characteristic of people in the transculturation situation.[6] The problem is enormously complex and has been studied only minimally but my own four-year study in Peru does not support this expectation. The important factors in the adjustment of migrants to Lima seem to have relatively little to do with migration as such. Many are faced with the necessity of learning new patterns in a short time, but my data indicate that they do so in a manner characteristic of their response to problems in the mountains.

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Drastic changes in personality were not found among the respondents, and changes in the degree and nature of social participation seemed to be largely within the control of the individual; that is, a man who desires either more or less contact with kinsmen and/or *paisanos* can usually arrange it either way. A man who wants the primary-group relationships of a small community in Lima can usually satisfy this want even as a man who desires to escape from precisely these relationships can usually escape. It is also possible for a man to cut himself off completely from contacts with his home locality, or to participate intensely with people from that locality in Lima and stay in almost daily contact with the actual home town through seeing visitors and making visits.[7] The most important "migration" in Peru, in terms of culture change, is not the move from the provinces to Lima but the sociopsychological change from a conservative Indian cultural group to modern Peruvian national culture. This may or may not be accompanied by geographical relocation.

For many people migration is a response to a change in level of aspiration; for others it is a continuation of some early aspiration; for still others it is forced by economic or political conditions. For some it reflects hope, for others despair. There are migrants who try to carry their mountain cultural patterns over into Lima, and among them are those who succeed and those who fail. There are also those who try to change markedly, usually in the direction of modern Peruvian culture and social class mobility, and among them there are those who succeed and those who fail. Actually most people fall somewhere in between. The largest numerical group, those who preserve a semblance of mountain culture in Lima, appears to be only a one- or two-generation category, since most of the individuals involved do not want their children to remain in the same condition. They are in fact markedly and unrealistically upwardly mobile for their children while maintaining low levels of aspiration for themselves.[8] One place to study most types of migrants from the mountains to Lima that satisfies the anthropological bias for community studies and has the practical advantage of localizing informants is the "clandestine urbanization," or squatter settlement, called a *barriada*. After residing in Lima for some time many of the migrants discover the *barriadas* that ring Lima on the hillsides and river banks. The backgrounds of the residents vary tremendously, but one *barriada* does not seem very different from another.

Barriadas are located on state, municipal, or church lands in or near the city. They were originally formed by some sort of an organized invasion and each has a formal association and is considered a community by the residents.

At its worst a *barriada* is a crowded, helter-skelter hodge-podge of inadequate straw houses with no water supply and no provision for sewage disposal; parts of many are like this. Most do have a rough plan, and most inhabitants convert their original houses to more substantial structures as soon as they can. Construction activity, usually involving family, neighbors, and friends, is a constant feature of *barriada* life and, although water and sewage usually remain critical problems, a livable situation is reached with respect to them.

In a 1956 census Matos Mar of the University of San Marcos showed a population of approximately 120,000 in 56 *barriadas* of Lima-Callao.* In 1958, a somewhat less-carefully taken census of roughly the same area showed a population of 276,600 in 129 *barriadas*. The latest official census[9] figure for Lima-Callao is 592,347, taken from the 1940 census. The calculated population for 1957 for Lima-Callao is 1,260,729.[10] Granting considerable leeway for error in all the figures, it would seem that from 10 to 20 per cent of the population of Lima lives in *barriadas*.

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* Matos Mar, José, Censo de las Barriadas de Lima, 1956 (unpublished manuscript).

Lima is changing rapidly, as are the *barriadas*, and it is difficult to compile a list of characteristics that will apply to all *barriadas* or to any one *barriada* over a period of time. It is possible, however, to describe an ideal type of *barriada* and indicate the direction of change. There is variation between *barriadas*, of course, but their histories are remarkably similar.

A typical *barriada*, allowing for a few months' settling period, exhibits the following characteristics:

(1) The overwhelming majority of the adults are provincial-born, and the majority of these are from the mountains. They are usually young people with children; there are few adolescents or aged.

(2) Few residents have come to the *barriada* directly from the province, but have resided for some time in Lima.

(3) The residents are all "owners" of the lots and the straw-mat houses they themselves have constructed. In some cases there has been land speculation from the beginning, but generally speculators have been rare among the original settlers. There are no units that are not dwellings, and the usual household group is the nuclear family. In many cases the association will allow only nuclear families and married couples to build.

(4) There is a feeling of separateness from the city, a feeling of being under attack, which is reinforced by the lack of municipal services and protection and by unfavorable public attitudes toward *barriadas*.

(5) There is a relatively high degree of integration and "belongingness," and considerable pride in achievement and satisfaction with home ownership.

(6) The *barriada* associations (such as Fathers of Families of Mariscal Castilla, Defenders of Mirones, and Home Owners of Santa Clara de Bella Luz) consist of self-appointed groups, usually the leaders and organizers of the original settlements, and leadership is based chiefly on the personality of the members plus kinship and regional loyalty.

The direction of change for each of the above items seems to be as follows:

(1) The percentage of provincial-born goes down as more children are born in a *barriada*. The heads of new families, both those who construct new homes and those who replace moving families, continue to be provincial-born, and many people come from the provinces to reside in the new house of a relative.

(2) More people come directly to the *barriadas* from the provinces, often upon the advice and with the assistance of relatives and kinsmen.

(3) Renting becomes more frequent, and many individuals sell, lease, or lend their houses, almost always without having clear title. The number of boarders goes up as does the number of extra people in the household. The open conflicts over lot ownership characteristic of the early period give way to litigation before the *barriada* association or in the police stations and courts. Many open stores or bars in houses and some public buildings (school, assembly hall, office for

association, movie) are constructed. A half-finished chapel is a common sight. Most houses are gradually converted to cement and brick. The nuclear family is augmented by relatives of various degrees of closeness; desertion by husbands is common enough to make the woman-children household a frequently encountered phenomenon.

(4) Generally the feeling of separateness lessens and services increase, but there is considerable variation on this point. In many cases, where there has been no continued pressure for the land from outsiders or where the inhabitants have successfully resisted such pressure, the area gradually becomes "urbanized" and blends into the city, as in the case of Zarumilla and parts of Fray Martin de Porres and Mirones. The electric company serves the area, branch banks and stores appear, movies are opened, bus lines operate, priests come, and finally the government recognizes the existence of the *barriada* for more than tax collection by appointing school teachers and, in one case, even appointing two mounted police to patrol an area of five square miles and 20,000 people.

(5) Belongingness and integration tend to be replaced by coresidence. The original settlers are swallowed up by the growing population, and some of them move out. The need for unity in defense against outside threats to the *barriada* lessens, and internal tensions increase. Many more people rent, and many of the older inhabitants, who were pleased with their situation at first, begin to complain of the surroundings, quarrel with their neighbors, and comment unfavorably on new arrivals ("Too many brute-Indians," "Too many brute-Negroes," and "Too many bad people"). Many individuals also develop new, or reinforce old, relationships with outsiders on the basis of such ties as kinship, region, occupation, and politics.

(6) The association takes on a more political character and, even though personality and regionalism continue to be important in the local elections, national politics and national issues play a larger part. The original leaders often move out (in which case they may or may not continue to exert influence) or, following a time-honored Peruvian tradition, a reform faction accuses them of stealing money and they, in turn, can choose to fight, flee, or sulk. As the *barriada* becomes more a part of Lima the association usually loses power.

For most of the migrants the *barriada* represents a definite improvement in terms of housing and general income, and Lima represents an improvement over the semifeudal life of the mountain Indian, Cholo, or lower-class mestizo.

There is very little violence, prostitution, homosexuality, or gang behavior in *barriadas*. Petty thievery is endemic throughout Lima, but *barriadas* seem somewhat safer than most neighborhoods in this respect, perhaps because there is less to steal.

In collaboration with Humberto Rotondo, a psychiatrist from the Ministry of Health, and José Matos Mar, an anthropologist from the University of San Marcos, a study of one *barriada* was carried out during 1958 and 1959. In addition to traditional anthropological methods such as observation, conversation, and participation, we administered five questionnaires, including the Cornell Medical Index, to a selected sample of 65 of the 600 families. In 1959 I also assisted Walter Slote, a psychoanalyst, in the collection of Rorschach and partial TAT records from an arbitrarily-chosen group of residents.

The material has yet to be systematically analyzed but, in regard to pathological behavior, it does not seem to be directly related to migration. The high percentage of "yes" answers on the Cornell Medical Index indicating the presence of neurotic and psychotic symptoms does not seem very different from the percentage on records of mountain residents from Huancavelica and Puno. In fact my own work and that of Wellin[11] indicate that a general preocupation with illness (real and imagined), panic reaction to illness, and a belief in the relatedness of personal responsibility to illness through witchcraft and taboo violation seem characteristic of both Indian and Mestizo culture throughout Peru.

Rotondo's interviewers administered a modified inventory of symptoms of childhood behavior problems to mothers in the sample, and they found a very high frequency of fear of the dark and bed-wetting in children up to the age of 12.[12] At my suggestion some local disease categories were added to the list (such as evil eye, fright, and bewitchment), and most of the symptoms of illness such as vomiting, diarrhea, and fever were classified by the mothers into these categories, which are also the common diseases of children outside of Lima.

Rotondo has noted, in another study,[13] the incidence of respondents who, although in precarious situations economically and socially, felt themselves to be objects of envy. This is also true in the *barriada* we studied. Assuming a certain amount of projection, it would seem that there is considerable envy of those whose dependency needs are satisfied. I encountered this phenomenon frequently in my work in the mountains of Ancash.

Another characteristic we noted in the *barriada* that is also commonly noted throughout Peru is relatively severe depression. Descriptive words such as "depressed," "sad," and "pitiful" occur with great frequency in our interviews and field notes. The humble, passive, tranquil, modest individual described by many informants as the ideal personality type is not strong and forbearing but rather frightened and ineffective.

Another set of phenomena that have their mountain counterparts but are more extreme in Lima and are more Creole or Mestizo than Indian are the following ambivalent attitudes about marriage and the family:

(1) A large number of men and women, both in and out of the sample, say that marriage is desirable and to be sought, but at the same time say that the bachelor has more possibilities than the married man and "My failure was caused by marrying too young." This is also illustrated by frequent contradictory statements about spouses in the same interview, for example, "My husband is a good man with me and with the children"; "If my husband hadn't abandoned us when I had epilepsy I would have recovered faster"; and "He has been a disillusion for me."

(2) Many respondents express open ambivalence about children, which is quite rare in the mountains. "My happiness is with my children"; "My children are a burden to me"; "My children will take care of me when I am old—I can call on them for anything"; "I am disenchanted with my children—they care only for themselves"; "I am happy only in my home with my wife and children"; and "I am unable to progress because of too many children."

(3) A common contradiction that may not be as contradictory as it first appears is that in which one encounters verbalizations about happiness and enjoyment only with wife and children from the very same men who habitually

beat their wives and children. Violence toward wife and children is the most frequently encountered form of violence in Peru and, in many cases, there was no hint of it in the questionnaires. This was one of the many occasions where the questionnaires became valuable only in conjunction with the observational data of the anthropologist.

(4) Although fathers are quite indulgent and loving toward sons during the first six or seven years, avoidance and tension are common in the relationship from that time on. Fathers often assert their authority verbally and physically, but the children generally side with the mother; the father's intimate relationships tend to be with male peers and with his own sisters and, to a lesser extent, his brothers.

The perception of the mother seems to be represented by two extremes: the good mother and the bad mother. One image is the nurturing, comforting mother one can depend upon for support and counsel; the other is the mother who says, "Go out and succeed" but who also communicates in other ways that the child had better not leave or he will be a social and moral failure. Abandonment by the parents, especially by the mother, is one of the most commonly encountered themes in the *barriada* data and in Peruvian folklore. The search for someone to depend upon is carried on in many situations, constantly ending in disillusionment.

One informant, a 30-year-old mestizo married man with two children, who migrated from the mountains of Ancash to Lima and was unemployed at the time of the interview, expressed a view of his plight that in addition to being poetic, is a prototype of the sociopsychological situation of many lower-class Peruvians. The following story, a combination of Hansel and Gretel, a Peruvian folktale,[14] and the informant's own projections, was given as a response to the blank TAT card. Among other things it brings out the theme of abandonment by the parents and disillusion in other substitute authority figures.

"These are monsters, very ancient things. The monster had power because he was from God—against human beings. There was a married couple in a place where there was nothing to eat—a poor family. They had two children, a little girl and a little boy. The parents went far away to look for food. They found only one piece of bread for themselves at night. The children were waiting for their parents. When the parents arrived the children woke up asking them for bread. Not finding any food for themselves, the parents decided to throw the children off a precipice far away. The mother said it was better to kill them; the father said it was not better. They decided not to kill the children there but to put them in a bag and to take them to the precipice. They left them hanging in the air by a rope over the precipice. During the day the children cried for help. Hearing this, a condor came and took them, carrying them down to the ground. The children got out of the bag and started to walk. The condor flew away, scared. The children walked alone to an unknown place. The little girl was 10 and the boy only 5. The girl spoke perfectly and could walk. During that whole day they found only one kernel of corn, which somebody had thrown out; they divided it in two and ate. In that lonely place they cried in the night for their mother and father. A high voice answered their call. A little while later the monster presented himself to the children and took them to his cave. Then the monster spoke. He said, 'Who are you and from where did you come?' The children said they had lost their parents, and the monster said, 'I'll take care of you.' The monster put rocks in a pot and boiled them as though they were potatoes, but the children couldn't eat them because they were rocks. The monster began to eat the rocks as though they were stewed potatoes, trying to show them how to eat, but they couldn't eat them. He said, 'If you can't eat these potatoes, I'm going to eat you.' While the monster was asleep in his cave, the children escaped. The children, fleeing, found a wooden cross, and they said, 'Sir, save us from this danger, we've lost our parents.' They heard the monster coming. They went to hide under the cross, and when they hid under the cross there was no monster. They heard a voice from the sky that said, 'My children, come up.' Looking up they saw nothing but a rope ladder. They went up the ladder to the sky—into space. Then the monster came and asked the cross to put the ladder down so he could follow the children. The cross did, and he started up the ladder after the children. The monster said, 'Just as you have God, I also have God, and when I catch you I'll eat you.' But on the ladder the monster was climbing there were two rats and they were tearing the rope ladder. The monster said to them, 'Brothers, don't destroy my ladder, I have to destroy my prisoners.' The rats answered, 'For a bad person there is no ladder to God.' Then they tore through the ladder, and the monster fell to the ground, landing on the edge of a hill. His blood splashed all over one tremendous hill and on to others; the hill he landed on exploded like a bomb. The story ends now. Whenever anybody calls, the hills answer or, better said, they echo. When somebody calls, he thinks it is a person answering, but it is not a person."

References

1. Kubler, G. 1952. The Indian Caste of Peru, 1795–1940. Publ. 14, Institute of Soc. Anthropol. Smithsonian.
2. García Frías, R. 1947. Intensidad absoluta y relativa de la emigración provinciana al Departamento de Lima. Estadística Peruana. **5:** 54–66.
3. Beals, R. 1953. Social stratification in Latin America. Am. J. Sociol. **58:** 327–339.
4. Mangin, W. 1955. Estratificacion social en el Callejón de Huaylas. Revista museo Nacional. **24.** Lima, Peru.
5. Simmons, O. 1952. El uso de los conceptos de aculturación y asimilación en el estudio del cambio cultural en el Perú. Perú Indígena. **2**(4): 40–47.
6. Fried, J. 1959. Acculturation and mental health among migrants in Peru. *In* Culture and Mental Health. M. K. Opler, Ed. Macmillan. New York, N.Y.
7. Mangin, W. 1959. The role of regional associations in the adaptation of rural population in Peru. Sociologus. **9:** 21–36. Berlin, Germany.
8. Mangin, W. Conflictos Culturales y Salud Mental. Paper presented at 2° Latin American Congres for Mental Health, Lima, 1959. In press.
9. Censo Nacional de Población del Perú. 1940. Ministerio de Hacienda. Lima, Peru.
10. Estadística Peruana. 1958. Ministerio de Hacienda. Lima, Peru.
11. Wellin, E. 1955. Water boiling in a Peruvian town. *In* Health, Culture and Community. B. Paul, ed. Russell Sage. New York, N.Y.
12. Gildea, M., H. R. Domke, I. N. Mensh, A. D. Buchmueller, J. C. Glidewell & M. B. Kantor. 1958. Community mental health research: findings after 3 years. Am. J. Psychiat. **114:** 970–976.
13. Rotondo, H. *et al.* 1959. Estudios de psiquiatría social en áreas urbanas y rurales. Mendocita. (Mimeographed.)
14. Arguedas, J. M. & F. Izquierdo Ríos. 1947. Mitos, Leyendas y Cuentos Peruanos Lima, Min. Educ. See story "El Achiguée," pp. 130–134 for similar themes.

VARIATIONS BETWEEN NEGROES AND WHITES IN CONCEPTS OF MENTAL ILLNESS AND ITS TREATMENT*

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In spite of the tremendous amount of work that has gone into the study of mental illness since World War II, there are fewer than a score of available reports that discuss in any way the Southern Negro and mental illness. Such current information is not only rare, but in many instances it is contradictory. The theoretical approaches as well as the research procedures used in these few studies are so divergent that their conclusions can be compared only with considerable reservation. Nevertheless, in order to establish a tentative foundation for further investigation, it is necessary to consider and compare the conclusions that have been made.

There are five major topics that appear as "conclusions" in one or more of the available studies:

(1) The question of possible differences in the incidence rates of mental illness between white persons and Negroes has been raised more frequently than any other. On the basis of the studies made by Malzberg,[17] not only he but also Myrdal[16] and Rose[21] conclude that the Northern Negro has higher incidence rates than the Northern white but that these differences are not in any way associated with physiological characteristics.† The differences in incidence rates that have been presented in various studies are those indicated as related to cultural and demographic variations only.

The conclusions drawn by writers since Malzberg's study agree on this point but disagree on the question of which racial group has the higher incidence. The dominant trend of the current data (frequently based on first-admission rates and never on prevalence rates) suggests that generally the Southern Negro[2] has a lower incidence rate than does the Southern white.‡

(2) Although the incidence rates are held to be lower for Southern Negroes than for whites, the commitment rate of Negroes to Southern state mental hospitals is considerably higher than it is for the whites in this region.[1,2,5,9,10,11,13,15,20] There is some evidence that suggests that the ratios of commitments for Negroes and whites have not changed significantly over the years.[15] The procedures of commitment also differ somewhat between the two racial groups, with the Negroes having the higher incidence of jury commitment.[7]

(3) Following commitment the Negro patients receive less treatment and care than do their white counterparts, according to most of the writers who

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† Lemkau concludes that Negro children have a higher rate of mental deficiency than white children.[4]

‡ For both psychoses and neuroses, Negroes are found to have lower rates than whites, adults as well as children. The Negro female has the lowest rate of all adult divisions.[3,5,8,10,11,15]

discuss these aspects of the illness sequence.[1,8,17,27] When the question of release from state mental hospitals is considered, the rates are found to be uniformly lower for Negroes than for whites.[1,8,13]

(4) In all but Adler's[6] Arkansas studies of the reintegration of Southern ex-mental patients into their families and communities,[1,8,12] the Negroes are accorded the highest "success" rate.* When the white and Negro cases are compared in Adler's study, the Negroes have a larger rate of in-hospital deaths, a lower release rate, a higher rate of rehospitalization, and a smaller "success" rate. The report from the Taft Hospital (all Negro) disagrees with Adler's findings but contains no data in support of their findings.[12] The logical implication present in most of these studies seems to be that the Negro mentally ill person is "sicker" than the white mentally ill person at time of commitment, while the reverse implication is made for ex-mental patients.

(5) In studying the attitudes of Southerners toward mental illness and mental patients the empirical data available consistently support the conclusion that Negroes are on the whole less "understanding" and less "acceptive" than are whites.[8,14,30] The Taft Hospital report, however, presents the opposite conclusion. This is one of the most difficult areas in which an attempt to compare conclusions can be made. For example, the weaknesses of the polling technique identified by Whatley[14] may account for his demonstrated differences rather than any real variations in attitudes between the two racial groups.

On the basis of the opposing conclusions presented above this study becomes in a real sense an exploratory one. The attempt here will be to examine and compare certain gross factors as they pertain to the response patterns obtained from randomly drawn samples of Texas Negroes and whites. The analytical process will be divided into two parts: (1) an examination of known cases of mental illness among family members and friends for the two samples will be made; and (2) evaluations of mental illness and its treatment expressed by the two samples will be compared.

Two major hypotheses will be tested:

(1) If the incidence rates of mental illness are lower for Negroes than for whites in Texas, then the known instances of such cases among family members and friends should be lower for the Negro sample than for the white.

(2) Because of their relatively disadvantageous social position the Negro sample will reflect less understanding and acceptance of mental illness than will the white sample.

The first hypothesis is predicated on the chance factors of incidence and contact, holding a direct ratio between incidence and contact. The attempt here will be not to establish total contacts with mentally ill persons but to establish only those contacts that involve primary relationships. There are two reasons total contacts could not be used as variables. First if the interpreters of the Negro society are correct, the primary contacts and circles of recognition and identification of members of the same race are more highly developed among Southern Negroes than among the Southern white population.[12,16,22,23,27,39]

Conversely, because the whites occupy the authority positions in the community in all spheres of activity (such as medical, legal, political, and economic), whites will be brought into contact with the Negro mentally ill (particularly for treatment and/or commitment) while the Negroes will usually not have any contacts with the white mentally ill. The incidence of jury commitments for Negroes as reported by Friedsam *et al.*[7] supports this latter assumption.

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* Adler's findings disagree with these and even with Stewart's.[9,13]

The second hypothesis is predicated on the assumption that there is a relationship between the socioeconomic position of a respondent and his evaluations of mental illness and mentally ill persons. Implied in this assumption is the disparity in education between Negroes and whites, as well as in secondary exposures to knowledge such as is generally presented through newspapers, magazines, television, and radio. Concommitant to this hypothetical assumption are such influencing factors as: (1) recognition of the mentally ill, which is related to definitions of deviant behavior;[4,23] (2) tolerance levels, which appear to be only a more rigorous application of this same principle;[13,24,28,29,31] and (3) reluctance to commit a mentally ill relative to a state mental hospital. For example, most of the studies concerning Southerners and mental illness present evidence[2,3,5,8,10,11,15,25] that supports the contention that Negroes[5,12,25] tend to be reluctant to commit their aged and females.*

The Paradigm

As a general summary the situation in which the following analyses will be made may be defined as the following:

The cultural and demographic characteristics of the South are related to the etiology of mental illness in such a way that Negroes have *lower* incidence rates than whites. Because of the traditional action patterns, the economic differences, the variations in life-styles, and the inequalities in political influence, the commitment rate to state mental hospitals is *higher* for Negroes than for whites.

The lower incidence rates for Negroes is directly associated with a lower "contact with the mentally ill" rate. The Negroes, because of fewer contacts and because of their relatively lower level of formal education, have less understanding of mental illness than do Southern whites.

Contrary to this fact is an indicated reluctance on the part of the Negro to commit a fellow Negro, particularly a female or aged person. However, any Negro who manifests "mental illness" and can no longer be tolerated by his group represents in one sense a "threat" to the security of the group because at that point the Negroes must either invite or accept the interference of the white authorities in the case. Thus the attitudes Negroes have toward unmanageable mentally ill persons are probably not only more complex but also less acceptive than the attitudes of the whites.

Following commitment the Negro patient has a greater chance of dying in the hospital and a smaller chance of being discharged. Following discharge the Negro *ex-mental patient* is probably not rejected socially by his group, but because of the existing cultural and economic pressures he has a poorer chance of being reintegrated into a family unit and the economic life of the community than does his white counterpart.

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* Kaplan presents an opposing interpretation.[26]

THE PROJECT AND ITS PROCEDURES

The samples to be discussed were drawn from four communities, two in an east Texas state mental hospital district and two in a west Texas district. The populations of these communities varied from 25,000 to 74,000, and the percentage of Negro citizens in each community varied from an estimated 5 to 22 per cent (TABLE 1). The communities represented four different economic and historical types, and also differed in their relative distance from the state hospital that provided treatment for their committed citizens.

A dual approach was used in the field work. One staff member (a psychiatric social worker) interviewed the "significant others" around the 120 ex-patients selected for that phase of the study. The second member (a sociologist) interviewed the key functionaries and responsible others in each community who, because of their role and/or interest, would be expected to encounter citizens with a problem of mental illness involving self, family member, or friend. Approximately 375 interviews were obtained from these "leaders" in the four communities.

TABLE 1

A COMPARISON OF POPULATION DISTRIBUTIONS ON A RACIAL BASIS FOR FOUR COMMUNITIES AND THEIR RANDOM SAMPLES

Population	Communities			
	A	B	C	D
Estimated population 1957	26,500	73,600	28,000	24,800
Per cent Negro	8	5	8	22
Number of cases in sample*	127	351	125	115
Per cent Negro	9.4	6.0	8.8	24.3

* The number of cases in each sample represent all persons over the age of 15 who were present and would cooperate when contacted in a 1 per cent random sample of household units.

As a second phase of investigation in each community a 1 per cent random sample of households was selected and all persons in those households over the age of 15 who were present and would cooperate at the time of contact were given a questionnaire to complete. These contacts were made by local people (usually college students) hired and trained in each community. Assignments were made in such a way that all first contacts were made on one day, a second day being allowed for follow-up work. Substitutions of selected households were permitted under controlled conditions.

Standard precautions were employed, including the use of Negro and Mexican-American interviewers for all cases of these ethnic types. In all, 473 households were successfully contacted, fulfilling the sample design in each community. From this effort 718 usable questionnaires were obtained.* Each questionnaire was completed without assistance from the contact person, and the respondent placed his booklet in a separate envelope and sealed it before returning it to insure anonymity. Each questionnaire was later coded, and the data were transferred to IBM cards for machine analysis.

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* Sixty-three additional questionnaires were obtained but had to be rejected when checked. Printing errors in the questionnaires invalidated 22 of these. The remaining 41 were either incomplete or had been returned blank. This loss represents 8 per cent of the booklets administered.

The questionnaire used in this survey was rather extensive; it required about 50 minutes or more to complete the three parts. Part I contained a battery of 60 opinion items; Part II contained nine semantic differential patterns; and Part III consisted of a complex of sociological background items, a series of communication exposure questions, and a series of items designed to elicit information concerning the respondent's contacts and experiences with mentally ill persons. The final component in Part III was the seven-item Woodward-Roper poll.[30]

The first two parts of the instrument were developed as independent instruments by Nunnally.[32,33] In this report we deal only with the materials derived from responses to Parts I and III.

Characteristics of the Samples

The respondents. The background characteristics of the Negro and white respondents differ according to the manner long identified with these two groups in the Southern population. The respondents in the Negro sample (when contrasted with the white) had a higher proportion of persons in the older age brackets, a higher proportion of persons with disrupted marital arrangements,* were predominantly Texas born, and more than one half were Baptist.

In general the Negro respondents had received less formal education than the whites, although a significantly larger percentage of the Negroes in this sample had completed college plus some graduate work (TABLE 2).†

The respondents' families. Any statistical comparison of Southern Negroes and whites is, of course, inadequate in revealing the real differences that exist between these two groups. The gross facts as revealed through our respondents are these: the total money earned by Negro families is considerably less than that earned by white families; the Negro families live in smaller houses and have remained in the same community for a longer time. The major wage-earner in the Negro family is usually employed in an unskilled or semiskilled job. There was a slightly higher representation of Negroes in the "professional" group. These families had some member employed as a school teacher, confirming the higher incidence of "graduate work" for Negroes (TABLE 3).

It must be concluded that these samples are not completely representative of their respective universes of Texas Negroes and whites. Basically the sam-

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* The accuracy of this sample concerning its incidence of disrupted marital arrangements may be verified through several sources: (1) national figures for Negroes over age 14: single—24 per cent; married—63 per cent; widowed or divorced—13 per cent;[34] (2) Texas figures for Negroes over age 14 (1950); divorced or widowed—15 per cent;[35] (3) A special study of one Texas city that used a sampling procedure similar to the one developed for this project revealed that 22 per cent of the Negro respondents had experienced a disrupted marital arrangement.[36] In this special study, as well as in our own, those respondents who were "separated" were included in the category with disrupted marital arrangements, a possibility that may account for the higher incidences here.

† These samples vary widely concerning attained educational levels for their national universes. National data for 1950 indicates that only 5 per cent of United States Negroes had attended college and that only 14 per cent of the whites also experienced one or more years of college training.[34]

TABLE 2

VARIATIONS IN BACKGROUND CHARACTERISTICS BETWEEN SAMPLES OF TEXAS URBAN NEGROES AND WHITES: THE RESPONDENTS

Characteristic	Percentage of samples	
	White	Negro
(1) Sex distribution		
(a) Male	32	33
(b) Female	68	67
N. (number in sample)	596	67
χ^2—0.02690, 1f. n.s.*		
(2) Age distribution		
(a) 15–24	21	16
(b) 25–34	31	20
(c) 35–44	20	18
(d) 45–54	15	15
(e) 55–64	6	27
(f) 65–79	6	4
N.	641	67
χ^2—33.93444, 9f. $P < 0.001$.		
(3) Education		
(a) Grade 9 or less	22	46
(b) Grades 10 to 12	49	28
(c) Years of college 1 to 4	21	12
(d) Graduate work	7	14
N.	627	69
χ^2—27.83304, 6f. $P < 0.001$.		
(4) Marital status		
(a) Single	11	16
(b) Married	82	66
(c) Divorced, separated, or widowed	7	18
N.	645	70
χ^2—9.52455, 2f. $P < 0.01$.		
(5) Respondent's occupation†		
(a) Unskilled	4	23
(b) Semiskilled	5	3
(c) Skilled	8	6
(d) White collar	16	6
(e) Small business	3	1
(f) Professional	8	9
(g) Housewife	57	53
N.	621	70
χ^2—23.11680, 4f. $P < 0.001$.		
(6) Respondent's church membership		
(a) Belongs to none	7	11
(b) Baptist	37	54
(c) Methodist	18	13
(d) Roman Catholic	8	1
(e) Church of Christ	9	1
(f) All others	21	20
N.	602	70
χ^2—15.62033, 5f. $P < 0.01$.		
(7) Respondent's place of birth		
(a) Texas	64	90
(b) Oklahoma	10	3
(c) Arkansas, Louisiana, New Mexico, or Mississippi	9	7
(d) All other states or foreign	17	0
N.	636	71
χ^2—22.93508, 3f. $P < 0.001$.		

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* The statistical tests were made using *chi square* over the original frequency distributions. The degrees of freedom refer to the cell combinations of these tests and not necessarily to the sequence of cells as presented here.

† Occupational classifications were made following the basic concepts developed by Hollingshead. The category "housewife" was the only innovation.

ples represent those segments of both population groups over the age of 15 years; predominantly female housewives; some overrepresentation in the older age brackets for the Negroes; and both samples contain larger proportions of the more highly educated individuals than did their universes.

TABLE 3

VARIATIONS IN BACKGROUND CHARACTERISTICS BETWEEN SAMPLES OF TEXAS URBAN NEGROES AND WHITES: THE RESPONDENTS' FAMILIES

Characteristic	Percentage of samples	
	White	Negro
(1) Family income		
(a) \$2000 or less	8	29
(b) \$2001–\$5000	32	58
(c) \$5001–\$7000	32	7
(d) \$7001–more	29	7
N.	594	56
χ^2—62.26350, 7f. $P < 0.001$.		
(2) Occupation of major wage earner		
(a) Unskilled	7	48
(b) Semiskilled	14	14
(c) Skilled	25	4
(d) White collar	27	8
(e) Small business operator	11	2
(f) Professional	13	16
(g) Housewife (no occupation)	2	8
N.	559	50
χ^2—96.97135, 5f. $P < 0.001$.		
(3) Family has lived in same community for		
(a) Less than 1 year	15	0
(b) 1–6 years	35	16
(c) 7–12 years	19	13
(d) 13–30 years	22	45
(e) 31 years or more	10	26
N.	630	69
χ^2—43.0580, 7f. $P < 0.001$.		
(4) Number of persons living in respondent's house		
(a) 1	3	14
(b) 2	18	34
(c) 3	25	17
(d) 4	24	8
(e) 5	16	10
(f) 6	7	4
(g) 7 or more	6	12
N.	641	71
χ^2—34.33264, 5f. $P < 0.001$.		
(5) Number of rooms in respondent's house (including bathroom)		
(a) 1 or 2	1	6
(b) 3 or 4	15	36
(c) 5 or 6	52	46
(d) 7 or more	32	13
N.	641	70
χ^2—32.32029, 4f. $P < 0.001$.		

Our samples reflect neither children nor males adequately, nor perhaps even a segment of both populations composed of females employed away from the home. From a different perspective these samples *do* reflect the higher socio-economic elements in both universes, this bias being greatest for the Negroes.

There are several reasons why the samples are not more representative.

First, the selections were made by households through random choice on the basis of street and house number. Evidently many of the poorest Negro families live at locations that are not identifiable on this basis. Second, the only chance the interviewers had to contact employed persons was after working hours and, although the contacts were concentrated in these hours, the work had to be started earlier in the day, bringing about a limited selection of those household members at home. Additional tests and analyses are being conducted to determine what particular variations in response patterns are associated with the characteristics of sex, age, education, exposure to the mentally ill, and geographical (or community) location. For the purpose at hand, however, the two samples are considered to be adequately comparable.

Variations in Contacts with the Mentally Ill

Three items in the questionnaire were designed to obtain specific statements from each respondent concerning his contact with the mentally ill. The first hypothesis states that if incidence rates vary between the two groups then the group with the lower incidence rate should also have the lower exposure rate, at least in primary contacts. The first two response patterns in TABLE 4 fail to establish any significant differences in exposure rates between whites and Negroes. A slightly higher percentage of the Negro respondents indicated that some family member had been mentally ill, but a smaller percentage of the Negroes indicated that any of their good friends had ever been mentally ill. In fact the gross response patterns are so similar that a "conclusion," taking into account the limitations of the samples, could be offered that there were no differences between these two samples in exposure rates.

The indicated significant difference for Item 2 of TABLE 4 refers to variations in the *kind* of mentally ill friend rather than to known cases. A "middle-aged woman" was identified by the whites as the kind of mentally ill friend they knew about in most instances, although 69 per cent of them replied that they had never had a good friend who was mentally ill. More of the Negroes knew of a "mentally ill girl" than of any other kind among their friends. The sex-ratio of known mentally ill friends was approximately the same for the two samples, about two thirds of the cases being female. An interesting possibility that is not explored here is that the friendship patterns are basically "within sex" groupings, and therefore the sex ratio of the sample might produce the bias that has been identified. There also may be a problem here of word meaning; the use of the word "girl" by the Negroes may refer to a female of any age.

The third item in TABLE 4 provides evidence in support of the postulate that whites have more frequent contacts with persons who obtain treatment in state mental hospitals than do Negroes. It has been established previously that a slightly higher percentage of the Negro mentally ill (than the white) are treated in state mental hospitals, which further clarifies this assumption. Fifty-two per cent of the white respondents had had contacts with ex-mental patients from state hospitals as opposed to only 35 per cent of the Negroes.

Additional evidence may be presented in an attempt to clarify these points. On the basis of the data pertaining to the total flow of patients through the Texas state mental hospitals these conclusions may be offered: (1) significantly higher percentages of Negro females than white females were admitted and separated during the fiscal year 1958–1959; (2) more Negro females were admitted and separated than Negro males; and (3) the sex ratio for remaining patients was identical for both groups (TABLE 5).

When the gross rates are considered, the Negroes have the highest rates of admissions, separations, and remaining patients. These data may be summarized as follows: although it is generally accepted that the Negro is reluctant to commit a Negro female, more females than males were committed. The reverse was true for whites. Once admitted the Negro male was retained more frequently than the Negro female; there was no real difference among the whites on this factor. These data also corroborate the findings from other studies indicating that the Negroes are not released from state mental hospitals at the same rate as the white patients. No further comparisons on the basis of sex were possible because of the lack of adequate information (TABLE 6).

TABLE 4

VARIATIONS IN KNOWLEDGE OF AND EXPERIENCES WITH MENTALLY ILL PERSONS BETWEEN RESPONDENT SAMPLES OF TEXAS URBAN NEGROES AND WHITES

Characteristic	Percentage of samples	
	White	Negro
(1) Has any family member of the respondent been mentally ill?		
(a) No.	83	77
(b) A grandparent	2	3
(c) A parent	3	1
(d) A spouse	1	0
(e) A child	+	0
(f) Some other relative	11	15
(g) Several members	1	3
N.	623	71
χ^2—1.13344, 2f. n.s.*		
(2) Has any good friend of the respondent been mentally ill?		
(a) No	69	71
(b) Middle-aged man	6	5
(c) Middle-aged woman	12	1
(d) An elderly man	+	0
(e) An elderly woman	2	5
(f) A boy	2	1
(g) A girl	3	9
(h) Several friends	5	8
N.	617	65
χ^2—9.99130, 4f. $P < 0.05$.		
(3) Number of contacts respondent has had with persons treated in a state mental hospital		
(a) None	48	65
(b) One	20	16
(c) A few	25	12
(d) Frequent	5	4
(e) Daily	2	4
N.	636	69
χ^2—9.86295, 3f. $P < 0.05$.		

* Chi-square tests were made over the raw data in the two sample distributions. The degrees of freedom refer to these tests and not to the sequence of cells which are presented here.

The hypothesized relationship may now be demonstrated through analysis of the preceding data. The rates of exposure or contact with mentally ill persons are basically the same for the two samples. The rates of contacts with ex-mental patients are higher for whites than for Negroes, although admission and separation rates are higher for Negroes than for whites. It may be imputed as a tentative finding based on this indirect evidence that the incidence rates of mental illness are not significantly different between these two samples as revealed through the indicated contacts. The whites, however, do have disproportionately more contacts with ex-mental patients from state hospitals than do Negroes.

TABLE 5

VARIATIONS BETWEEN WHITES AND NEGROES IN POPULATION FLOW THROUGH ALL TEXAS STATE MENTAL HOSPITALS, FISCAL YEAR 1958 TO 1959[18]

Circumstance	Percentage of racial groups	
	White	Negro
Admissions:		
Males	55	47
Females	45	53
N.	11,891	1749
χ^2—45.0120, 1f. $P < 0.001$.		
Separations:		
Males	54	43
Females	46	57
N.	14,294	2188
χ^2—86.36568, 1f. $P < 0.001$.		
Remaining:		
Males	49	49
Females	51	51
N.	13,588	2269
χ^2—0.0001, 1f. n.s.		

TABLE 6

VARIATIONS BETWEEN WHITES AND NEGROES IN POPULATION FLOW THROUGH ALL TEXAS STATE MENTAL HOSPITALS, FISCAL YEAR 1958 TO 1959

Calculated Rates*

Circumstance	Rate per 100,000 population	
	All whites	All Negroes
All admissions	147	167
All separations	176	210
Remaining patients	167	226
	—	—
1957 Texas population: 9,138,000†	88.6%	11.4%[35]

* These rates were computed using the 1957 Texas population estimates against the population flow data presented in TABLE 5 and consequently may be slightly higher than the real situation.

† Skrabanek and Bowles;[19] this is the most rigorous estimate currently available.

Two additional questions were asked these respondents concerning their contacts with state mental hospitals. The response patterns were not significantly different between Negro and white respondents to either question. The first question asked was whether the respondent had ever visited anyone at a state mental hospital; 77 per cent of the whites and 81 per cent of the Negroes responded "no" to this question. Evidently about the same proportion of each group had visited someone at a state mental hospital, but there was no evidence that permitted identification of the "someone" visited (whether he be patient, attendant, or physician). The final question asked whether the respondent had ever done any volunteer work in a state hospital. Only one of the Negro respondents (approximately 1 per cent) and 5 per cent of the whites had done so. The whites in this sample had a much greater opportunity to do such volunteer work because one of the communities had a state mental hospital located on its periphery, and this hospital did not accept Negro patients or Negro volunteer workers.

Variations in Evaluation Patterns

The evaluations that will be considered in testing the second hypothesis were obtained through the use of two instruments: (1) the seven-item Woodward-Roper poll, and (2) the first 40 items in the opinion instrument developed by Nunnally.* The disparity between the samples of Negroes and whites in educational attainments has been identified, and is not as great as could be expected for the Negro population at large. However, the differences between the two samples are still significant and important. When the differences between these samples concerning their exposure to knowledge available through mass communication media are considered, another important element in this analytical situation becomes apparent (TABLE 7).

Perhaps the difference between Negro and white life-styles is nowhere more conspicuous than in the utilization of communication media. The low incomes, long working hours, lack of formal education, and even lack of opportunity or access preclude the Negro's participation in some communication activities. To a Southern Negro family trying to survive on $2000 a year a television set is an expensive luxury. Even the $2.00 a month for a newspaper, which seldom contains specific news about Negroes in any case, would be an economic burden. Unless there is an all-Negro movie theatre in the community, the Negroes must "jim crow" their viewing of the cinema at prices that are high for their economic status. There are magazines published for Negroes on many Southern newsstands, and possibly these are widely read. However, the one source of mass communication that is readily available is radio. Radio sets are relatively inexpensive, particularly used ones, and can be listened to during working hours if the employer approves. Negro entertainers are evidently not discriminated against on most airways, and today there are even Negro radio stations that broadcast programs formulated for their own people.

This general description is supported completely by the differences in communication-exposure data as distributed for the two samples. A smaller proportion of the Negro sample watched television, read magazines and newspapers, and went to the movies than did the whites. More emphasis can be placed on the larger proportion of Negroes who listened to the radio, and evidently for more hours each day than did the whites in this sample.

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* A different analysis of data derived from this same study is presented by Crawford *et al.*[37]

During the first phase of work in each community, we interviewed the owner or manager of every local radio and television station, and made a content analysis of the local newspapers for a period of 10 months. In a separate study these data will be analyzed in conjunction with the communication exposure patterns and expressed evaluations in an attempt to ascertain whether content is related to these responses.

TABLE 7

VARIATIONS IN EXPOSURE POTENTIALS TO MASS MEDIA COMMUNICATION SOURCES AS DISTRIBUTED BETWEEN RESPONDENT SAMPLES OF TEXAS NEGROES AND WHITES

Characteristic	Percentage of samples	
	White	Negro
(1) Respondent listened to radio each day about		
(a) Does not listen	25	18
(b) Two hours or less	54	40
(c) More than 2 hours	21	43
N.	626	68
χ^2—26.40670, 4f. $P < 0.001$.*		
(2) Respondent watched TV each day		
(a) Does not watch it	12	32
(b) Two hours or less	40	35
(c) Two to 4 hours	32	21
(d) More than 4 hours	16	12
N.	627	63
χ^2—18.98880, 3f. $P < 0.001$.		
(3) Respondent read a newspaper each day about		
(a) Does not read one	4	16
(b) Ten minutes or less	14	29
(c) Eleven to 30 minutes	46	35
(d) More than 30 minutes	36	19
N.	636	68
χ^2—36.99520, 4f. $P < 0.001$.		
(4) Respondent read magazines each day about		
(a) Does not read any	25	39
(b) One hour or less	61	48
(c) More than 1 hour	14	13
N.	629	69
χ^2—6.86134, 2f. $P < 0.05$.		
(5) Respondent went to the movies each week about		
(a) Does not see any	12	18
(b) Once	83	77
(c) Two or more times	5	4
N.	623	71
χ^2—1.13344, 2f. n.s.		

* Chi-square tests were made over the raw data in the two sample distributions. The degrees of freedom refer to these tests and not to the sequence of calls which may have been collapsed for reporting purposes.

So far the relatively disadvantageous social position of the Negroes in this sample has been established and the disparity demonstrated between the Negro and white respondents concerning education and utilization of mass communication media. When the question of the recognition of mentally ill persons* was examined, only one important difference could be identified: the

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* Downes[40] presents a comparison of the differences between Negroes and whites in the impact of other kinds of illness.

Negro respondents did not identify as mentally ill the expected proportion of "middle-aged women." Otherwise the two samples were similar, suggesting that "recognition" may also be similar. We have no data that permit an examination of variations in tolerance levels, but the "established" reluctance of the Negroes to commit their females has been disproved. Consequently the impinging conditions that were developed to circumscribe the hypothesized relationship support the contention, and the second hypothesis may now be tested directly.

Findings from the Woodward Poll

The original poll data obtained by Woodward for Roper in 1950 were analyzed with his sample divided on racial lines as one phase of work. We were able to obtain only two of these distributions, which along with the results from our study are presented in TABLE 8. Although the responses to the first item are not correctly comparable (we added the words "in my city" to the original statement following the word "hospitals"), they are almost identical. The only real differences occurred in the percentages of the Texas samples indicating that they did not know the answer or did not care to answer.

In the response patterns to the second item both the Negroes and whites in the Texas samples were slightly more cognizant of the "correct" answer than were the Woodward respondents. Almost 10 years had passed between the two polls, which may in part account for these differences, but the sampling methods used in the two studies also differed. The largest percentage of "true" and "don't know" responses to this question occurred among the Negro respondents for the Texas sample; this suggests that they may be less sophisticated in this area of knowledge. The remainder of the items can be discussed only as they pertain to the Texas samples.

In the Texas samples there was a significant difference between the white and Negro respondents who indicated that mentally ill people simply do not wish to face their problems (TABLE 8, Item 3). These two samples were in basic agreement concerning the kind of treatment mentally ill people received in modern hospitals, although the majority of the Negro respondents indicated that they did not know the answer to this question (TABLE 8, Item 4).

Although the two samples were also in accord concerning the ability of "experts" to agree on whether a man was mentally ill enough to be put in an "insane asylum" (a possibly biasing word usage), a larger percentage of the Negroes indicated that it was worthwhile to get a psychiatrist's help when someone starts to "act queerly or get strange ideas." This is controvertible, for most of the Negroes in this sample had no access to a psychiatrist since three communities had no psychiatrist in practice. Almost all the Negroes would have been unable to afford such treatment if it had been available to them at regular fees.

Finally Item 7 in TABLE 8 indicates a slight tendency for the Negro respondents to be somewhat reluctant about disseminating knowledge of a mentally ill family member to friends and acquaintances. The differences between the two samples here could be caused by chance errors, and are certainly not significant enough to suggest reliability.

It may be suggested from these findings that: (1) the Negro respondents

TABLE 8

DISTRIBUTIONS OF RESPONSES TO A SEVEN-ITEM ROPER POLL* BETWEEN RESPONDENT SAMPLES OF TEXAS NEGROES AND WHITES

Items and responses	Percentage of samples			
	White		Negro	
	Texas	Roper	Texas	Roper
(1) There are not enough doctors or hospitals to give proper care and treatment to all the people who are mentally ill today (in my city):				
(a) True	63	63	66	67
(b) False	12	24	10	20
(c) Do not know and no answer	25	13	24	13
N.	646	3448	72	481
χ^2—.32292, 2f. n.s. (Texas samples only)				
(2) Most mental illness is inherited:				
(a) True	6	15	21	27
(b) False	72	74	39	57
(c) Do not know and no answer	22	11	40	16
N.	646	3448	72	481
χ^2—37.08736, 2f. $P < 0.001$. (Texas samples only)				
(3) The trouble with most people who are mentally ill is that they just don't want to face their problems:				
(a) True	37		61	
(b) False	34		8	
(c) Do not know	29		31	
N.	631		71	
χ^2—22.18320, 2f. $P < 0.001$.				
(4) Most hospitals for the mentally ill treat their patients very badly:				
(a) True	9		12	
(b) False	49		38	
(c) Do not know	42		51	
N.	630		69	
χ^2—3.23637, 2f. n.s.				
(5) The experts themselves often can't agree on whether a man is mentally ill enough to be put in an insane asylum				
(a) True	31		28	
(b) False	29		22	
(c) Do not know	40		49	
N.	632		67	
χ^2—2.27175, 2f. n.s.				
(6) It is always worth while to get a psychiatrist's help when someone begins to act queerly or get strange ideas				
(a) True	72		86	
(b) False	11		4	
(c) Do not know	16		10	
N.	631		70	
χ^2—6.12674, 2f. $P < 0.05$.				
(7) Suppose a member of your family became mentally ill. Do you think you would tell your friends and acquaintances about it just as if he had heart trouble or asthma, or would you try to keep it as quiet as possible				
(a) Tell to friends	42		32	
(b) Keep quiet	16		25	
(c) Do not know	43		42	
N.	628		71	
χ^2—4.94870, 2f. n.s.				

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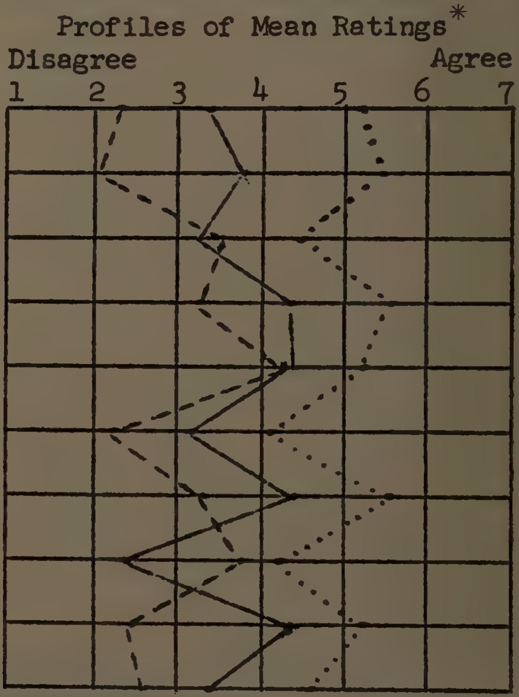
* Original Roper poll data. For a general presentation see Woodward.[30] We were able to obtain only two of the frequency distributions divided on racial identification from the Roper data.

were definitely more prone to answer "don't know" than were the whites; (2) the Negroes gave a more acceptive interpretation of the role of "psychiatrist"* and the hospitals that treat the mentally ill; however, they were also more prone to indicate that the people who are mentally ill are responsible for their own illness because they will not face their problems. Perhaps this latter finding is the most important in demonstrating the lack of "understanding" of the Negroes in this sample.

TABLE 9

COMPARISON OF THE MEAN CLUSTER RATINGS[32] OBTAINED FROM SAMPLES OF TEXAS NEGROES AND WHITES (SIGNIFICANTLY DIFFERENT ITEMS ONLY)

Cluster idea
- (1) Look and act differently
- (2) Will power
- (3) Sex distinction
- (4) Avoidance of morbid thoughts
- (5) Guidance and support
- (6) Hopelessness
- (7) External causes versus personality
- (8) Nonseriousness
- (9) Age function
- (10) Organic causes



* Key: White = ——; Negro = · · · ·; Nunnally's experts = - - - - .

Findings from the Nunnally Instrument

Although the Nunnally instrument contained 40 items that had been grouped analytically into 10 "clusters,"[32] significant differences between the Texas samples appeared in only 28 of these. For several reasons a direct comparison cannot be made between the data obtained through our use of these instruments and the data from the original Nunnally material.[38] In brief, however, Nunnally found that persons with higher educational attainments rejected the "mentally ill look and act different" cluster (TABLE 9, Item 1), and the "will power" is the key to mental illness cluster (TABLE 9, Item 2). These same respondents also rejected the belief that older persons are more susceptible to emotional disorders. Nunnally's older respondents were more prone to agree with the various statements, particularly with the idea that mental illness can be avoided if one keeps morbid thoughts out of his mind (TABLE 9, Item 4). The older respondents also indicated that mental illness is not as serious a problem as has been presented to the public (TABLE 9, Item 7).

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* One possible explanation of this "favorable" interpretation of "psychiatrist" may be the fact that the Negroes had had no contact with such medical persons. Their expression, therefore, could have been based upon a stereotype rather than upon fact.[41]

In dealing with the data developed from the Texas samples the basic plan of analysis established by Nunnally was followed, although the profiles are not comparable between the two studies. For the Texas samples, however, the profiles vividly demonstrate the differences in evaluations that are considered valid differences and not the result of chance factors.

In TABLE 9 the Negro respondents are represented with the higher percentage of "agree" responses for the items in each cluster. Individual testing of response patterns indicates that these are not response "sets." The Negroes were more prone to agree with the idea that the mentally ill do look and act differently and that an insane person can be identified by his appearance. The Negro respondents also agreed with the idea that "will power" is the mainspring of mental illness. According to the conclusions made by Nunnally these differences between the Negro and white samples could be related to the differences in educational attainments; there is also the possibility that the differences are related to age.

One of the most interesting variations occurred for the responses to items in Cluster 3 (TABLE 9). When contrasted with the whites, the Negro respondents had a higher incidence of responses indicating that women are more likely to develop mental disorders than men, but that women also find it easier to get over their disturbances. On the basis of the admission and separation rates presented in TABLE 5 the Negro respondents seemingly reflect the real situation concerning the mentally ill in their population segment, although their responses to these items diverge markedly from those of Nunnally's experts!

Other differences in the evaluations of the Negro and white respondents may be summarized as follows: the Negroes were more prone to express the belief that if a person keeps his thoughts centered on "happy" things he will not become mentally ill (TABLE 9, Cluster 4); that the maintenance of good mental health is related to a constant influence from "strong, supportive persons" upon the individual (TABLE 9, Cluster 5); and that the problem of mental illness for individuals as well as for the nation has been exaggerated (TABLE 9, Cluster 8).

Variations in the responses between the samples for four of the clusters permit more intensive utilization of the data. For example, the two items in Cluster 7 (TABLE 9) are antithetical: according to the Nunnally findings respondents who felt that an individual's mental condition could be helped by a change in physical environment were supposed not to feel that mental health was related to personal experiences during childhood. The Negro respondents in this sample were quite consistent in answering "agree" to both of these items. The whites were just as consistent in indicating less certainty in responses to both items. The related questions that dealt with supposed physical causation of mental illness (TABLE 9, Cluster 10) were also responded to by the

Negroes with high proportions of "agree" responses while the majority of the whites disagreed with these three items.

At this point it becomes rather apparent that the Negro respondents are less "understanding" than the whites concerning mental illness as it is currently interpreted by mental health practitioners.

In their responses to the items in Cluster 9 (TABLE 9), the Negroes revealed a much stronger sympathetic interpretation of the child and his emotional problems than did the whites. Also, there was a real difference between the two samples concerning their evaluation of older people; the Negroes felt older people had fewer emotional problems than younger people, and it should be recalled that there was a disproportionately large representation of older people in the Negro sample.

Finally, the three items in Cluster 6 (TABLE 9) may be considered singly because each item throws unique light upon the evaluations of the Negroes. The Negroes had a significantly higher percentage of respondents who felt that few people who enter mental hospitals ever leave (39 per cent for Negroes; 14 per cent for whites). Furthermore 45 per cent of the Negroes indicated that there is not much that can be done for a mentally ill person. Only 10 per cent of the whites expressed this same idea. The Negroes also had the largest percentage of respondents who indicated that ex-mental patients do make good adjustments to society when released, suggesting that they are more acceptive (at least in expressed evaluations) than are the whites.

To summarize: in the comparisons with the white responses, the Negroes indicated less understanding and less acceptance of the *mentally ill*. The Negroes indicated they believed that: the mentally ill could be readily recognized because of different behavior and appearance characteristics; a person with strong "will power" has less chance of becoming mentally ill; women are more likely than men to develop mental illness, but the illness is not as difficult for women to overcome as for men; the "avoidance of morbid thoughts" and the support of strong persons help prevent mental illness; once mental illness occurs there is little that can be done about it; and hospitalization is usually permanent for the mentally ill.

On the other hand the Negroes indicated a more sympathetic understanding of children and the aged, and they had higher expectations for the successful readjustment of ex-mental patients.

From these comparisons the conclusion can be drawn that there is a real disparity in the knowledge held by the Negroes in this sample concerning current theories of mental illness, its "cause," and its "cure" as contrasted with the white respondents. On the basis of their expressed evaluations it could be expected logically that the Negroes would be more reluctant to commit mentally ill persons, and when such persons were returned that the Negroes would also be more acceptive. Evidently the recognition of the mentally ill together with definitions of deviant behavior and tolerance levels all impinge upon the decision-making sequence leading up to commitment and, in the case of the Negroes, there seems to be little reluctance in committing certain kinds of disturbed persons. The same general practice obviously applies as well to the whites; the difference between the groups exists in the "kinds" of disturbed persons and perhaps the sequential timing of the decision.

In testing the second hypothesis it has been established that in general the Negroes were at a disadvantage in gaining knowledge about mental illness because of lower educational achievements and less exposure to mass communication media. Although there are seemingly no differences between these two samples in their rates of "exposure to the mentally ill," flow statistics for the state hospital system show that the Negroes have higher admission rates than whites. The Negroes in Texas do commit their females to state hospitals at a higher rate than do whites. On the basis of these findings the hypothesis may be accepted as a general statement of relationships.

SUMMARY

Although great cultural and demographic differences exist between Texas Negroes and whites, the "known-case" rates of mental illness for the two population segments are similar. On the basis of their expressed evaluations the Negroes in this study had a somewhat lower level of understanding of the current theories of mental illness than did the whites. On the other hand the Negroes revealed a more sympathetic understanding of children and of the aged than did the whites.

A "mentally ill person" is generally considered by the Negroes to have brought the problem upon himself and there is little that can be done for him. Therefore when contrasted with the white respondents, the Negroes appeared to be less understanding and less acceptive of *mentally ill* persons who become publicly recognized as such.

The commitment rate to state mental hospitals is higher for the Negro than for the white, and this is particularly true for the female. Following commitment the Negro male patient has less chance of being released than any other group of patients.

If released the Negro ex-mental patient evidently finds a more acceptive evaluational milieu among his own group than does the white ex-mental patient. The ability of the Negro ex-mental patient to survive in society is probably less influenced by his peers than by the general condition of the Negro in Texas. The reverse would be true for the white ex-mental patient.

The theoretical implications of this study are the following: the Negro in Texas lives in a true minority culture and group situation that differs from the dominant culture in ways long identified with disadvantaged minority groups. When an extreme difficulty like mental illness arises for a Negro, he generally has but one recourse: commitment to a state mental hospital. In order to accomplish this the Negroes must either invite or permit the dominant white authorities to intercede and exercise legal control over the disturbed individual.

Such an invasion of their relatively isolated society presents some threat to the Negroes as a group, and thus the person "responsible" may be rejected. Because of the values Negroes place on children and the aged, the group tends to protect them from such encroachments. The female, on the other hand, evidently does not enjoy this protection.

When the authorities permit the return of a Negro from a state mental hospital, his peers will probably accept the ex-mental patient readily. There is not much they can offer such a person in the way of economic support since they cannot offer such support to any dependent adult. Consequently, although the chances of successful reintegration of the Negro ex-mental patient appear to be greater than for the white, the reverse may actually be true because of economic pressures.

These theoretical implications will be tested more specifically as additional analyses are made of the data obtained through this project.

REFERENCES

1. Greene, J. E. 1938. Analysis of racial differences within seven clinical categories of white and Negro mental patients in the Georgia State Hospital. Social Forces. **17:** 211.
2. Lemkau, P., C. Tietze & M. Cooper. 1942. Mental-hygiene problems in an urban district, second paper. Mental Hyg. **26:** 100–119.
3. Lemkau, P., C. Tietze & M. Cooper. 1942. Mental-hygiene problems in an urban district, third paper. Mental Hyg. **26:** 288.
4. Lemkau, P., C. Tietze & M. Cooper. 1943. Mental-hygiene problems in an urban district, fourth paper. Mental Hyg. **27:** 287, 295.
5. Roth, W. F. & F. H. Luton. 1943. The mental health program in Tennessee. Am. J. Psychiat. **99:** 669–671.
6. Adler, L. M. 1953. The relationship of marital status to incidence of and recovery from mental illness. Social Forces. **32:** 185–194.
7. Friedsam, H. J., C. D. Whatley & A. L. Rhodes. 1954. Some selected aspects of judicial commitments of the mentally ill in Texas. Texas J. Sci. **6:** 27.
8. Stewart, D. D. 1955. Posthospital social adjustment of former mental patients from two Arkansas counties. Southwestern Soc. Sci. Quart. **35:** 319.
9. Adler, L. M. 1955. Patients of a state mental hospital: the outcome of their hospitalization. *In* Mental Health and Mental Disorder, A. Rose, Ed. : 501–523. Norton. New York, N. Y.
10. Jaco, E. G. 1957. Incidence of psychoses in Texas, 1951–1952. Texas State J. Med. **53:** 86–91.
11. Jaco, E. G. 1957. Social factors in mental disorders in Texas. Social Problems. **4:** 322–328.
12. Anonymous. 1958. Discharge rate at Taft Hospital arouses research interest. Mental Health Forum. **1:** 1–3.
13. Adler, L. M. 1958. The relationship of mental hospital admission rates and the outcome of hospitalization by educational level of patient. Proceedings of the Southwestern Sociological Society, Annual Meeting, April 4–5, 1958. (Abstr. only.) Dallas, Texas.
14. Whatley, C. D. 1959. Social attitudes toward discharged mental patients. Social Probs. **6:** 317, 319.
15. Seale, A. L., M. Miller, C. Watkins & C. Wurster. 1959. Changing nature of state hospital populations. Diseases of the Nervous System. **20:** 530–534.
16. Myrdal, G. 1944. An American Dilemma : 143, 979–981. Harper New York, N.Y.
17. Malzberg, B. 1944. Mental disease among American Negroes: a statistical analysis. Characteristics of the American Negro. : 373–399. Harper. New York, N.Y.
18. Annual Report. 1958–1959. Board of Texas State Hospitals and Special Schools for Fiscal Year. : 122.
19. Skrabanek, R. L. & G. K. Bowles. 1958. The 1957 Texas Farm Population, Progress Report 2037, Texas Agricultural Experiment Station. College Station, Texas.
20. Ivins, S. P. 1950. Psychoses in the Negro: a preliminary study. Delaware State Med. J. **22:** 212, 213.
21. Rose, A. M. & H. R. Stub. 1955. Summary of studies on the incidence of mental disorders. *In* Mental Health and Mental Disorder, A. Rose, Ed. : 101–106. Norton. New York, N.Y.
22. McGuire, C. 1951. Family backgrounds and community patterns. Mar. & Fam. Living. **13:** 163.
23. Hill, R., J. J. Moss & C. G. Wirths. 1953. Eddyville's Families. Institute for Research in Social Science. : 76–98, 124–127. Univ. North Carolina. Chapel Hill, N.C.
24. Van Vechten, C. C. 1940. The toleration quotient as a device for defining certain social concepts. Am. J. Sociol. **46:** 35–39.
25. Kadushin, A. 1957. Opposition to referral for psychiatric treatment. Social Work. **14:** 81–83.
26. Kaplan, B., R. B. Reed & W. Richardson. 1956. A comparison of the incidence of

hospitalized and non-hospitalized cases of psychoses in two communities. Am. Sociol. Rev. **21:** 479.

27. Rose, A. M. 1944. The Negro in America. : 215, 216; 293–311. Harper. New York, N.Y.
28. Lemert, E. M. 1946. Legal commitment and social control. Soc. and Social Research. **30:** 370–378.
29. Muntz, E. E. 1941. Limits of tolerance. South Atlantic Quart. **40:** 99–104.
30. Woodward, J. L. 1951. Changing ideas on mental illness and its treatment. Am. Sociol. R. **16:** 443–453 (Tables 16a and 16c).
31. Simmons, O. & H. Freeman. 1958. Mental patients in the community: family settings and performance levels. Am. Sociol. R. **23:** 147–152 (and other studies from this project).
32. Nunnally, J., Jr. 1957. The communication of mental health information: a comparison of the opinions of experts and the public with mass media presentations. Behavioral Sci. **2:** 222–230.
33. Nunnally, J., Jr. 1959. Tests and Instruments. : 284–320. McGraw-Hill. New York, N.Y.
34. Statistical Abstract of the United States, 1958. U.S. Government Printing Office. Washington, D.C. : 35, 110.
35. Texas Almanac. 1958–1959. The Dallas Morning News. Dallas, Texas. : 46, 95.
36. Crawford, F. R. & T. G. Fain. 1956. The impact of a tornado disaster upon a minority ethnic group. Proc. Southwestern Sociol. Soc. 1956. : 86.
37. Crawford, F. R., G. W. Rollins & R. L. Sutherland. 1960. Variations in evaluations of the mentally ill. Proc. Southwestern Sociol. Soc.
38. LaPiere, R. T. 1938. The significance of measurable attitudes. Am. Sociol. Rev. **3:** 179.
39. Kardiner, A. 1959. Explorations in Negro Personality. Culture and Mental Health. : 413–425. Macmillan. New York, N.Y.
40. Downes, J. 1948. Social and environmental factors in illness. The Millbank Memorial Fund Q. **26:** 371–376.
41. Sutherland, R. L., J. L. Woodward & M. A. Maxwell. 1952. Introductory Sociology. 5th ed. : 530, 531. Lippincott. New York, N.Y.

EPIDEMIOLOGICAL ANALYSIS OF THE HEALTH IMPLICATIONS OF CULTURE CHANGE: A CONCEPTUAL MODEL*

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Influenced largely by the views of investigators such as Chapin,[1] Frost,[2] Flexner,[3] and Gordon,[4,5] there has been a renewed appreciation during the past three decades that epidemiological techniques, which for the preceding century had been confined to a study of communicable disease outbreaks, could be applied to a study of all health phenomena. Recognition of the usefulness of this concept has been widespread, but translation into an operational frame of reference has often proved difficult and has led to considerable confusion. The failure, for example, to find a standard definition of epidemiology acceptable to all epidemiologists bears witness to this confusion.

In our opinion the major advances in knowledge of contemporary health problems expected from epidemiological investigations, with some notable exceptions, have not been fully realized. The confusion and difficulties that have limited the potential contribution of many such investigations may be traced to two interrelated misconceptions.

First there has been a failure on the part of some investigators to recognize that the significant contributions made by epidemiology in the past have been those in which it has been applied as an analytical rather than as a descriptive science. The major contributions of investigators such as P. Panum, J. Snow, J. Goldberger, and W. H. Frost resulted mainly from their skillful derivation of hypotheses rather than from the discovery of new data. Despite this, too many current epidemiological studies content themselves with describing incidence and prevalence data by selected demographic variables and drawing few if any inferences. Such conclusions as are derived are largely restricted to identifying high-risk population groups for case-finding purposes or estimating the volume and nature of service needs. Such studies have led to an unfortunate dichotomy in the minds of some between "epidemiological" and "etiological" investigations.

Wade Hampton Frost has perhaps best expressed the concept that to be productive epidemiology must be an analytical science. In his words: "Epidemiology at any given time is something more than the total of its established facts. It includes their orderly arrangement into chains of inference which extend more or less beyond the bounds of direct observation."[6]

Recognition of the validity of this view raises the second and more fundamental issue. What is the nature of the inferences that can be derived through epidemiological investigation? Specifically, has epidemiological analysis a contribution to make in identifying etiological factors, or is this the prerogative of clinical and laboratory investigation?

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* The views presented in this paper represent the combined thinking of the Department of Epidemiology. We are particularly grateful to the contribution made by Sidney L. Kark (at present World Health Organization expert at the Hebrew University Medical School, Jerusalem, Israel) during the year he spent as head of this department.

The answer to this question is dependent upon the nature of the model of health subscribed to and the nature of the phenomena included in the concept of etiology. Dating from the discovery of bacteria, medical thinking has until recently favored a closed-system mechanistic model of illness and health. This model ascribed a single specific cause to each disease which, if present, would ideally always cause the disease. Conversely any disease would always be due to a specific cause. Furthermore no factors would be accepted as cause unless they were directly related to the system primarily responsible for the symptoms of the disease. Thus tuberculosis was defined as a disease whose symptoms resulted from disturbances in the physiological system. Within such a closed-system model, disturbances in other systems (psychological or social, for example) associated with tuberculosis would not be admitted as causes. The cause of tuberculosis was the tubercle bacillus.

Subsequent developments in medical thinking extended the concept from single to multiple causation and introduced various terms such as predisposing, contributory, precipitating, and sufficient and necessary causes. Such developments were undeniably useful, but they overlooked a major weakness in the closed-system model. Even within a multicausal framework once a cause or series of causes have been identified, they are regarded as causes for their disease under all circumstances.

This concept, while useful in the study of communicable disease, posed difficulties when applied to diseases where microorganisms were not involved. Thus in nutritional diseases lack of niacin was originally postulated to be the cause of pellagra. Subsequent studies, however, showed that pellagra did not occur in noncorn eaters no matter how low the level of niacin.[7] Niacin lack therefore could only be regarded as the "cause" of pellagra under certain circumstances, namely, the presence of corn in the diet. Lack of niacin under other circumstances did not cause pellagra. While it may be feasible to include such data within a closed-system model, by regarding niacin lack as a necessary but not sufficient cause of pellagra, additional experience with niacin renders such a conceptualization less useful. For example, administration of large doses of niacin to pellagrins may alleviate some of their symptoms but produces other symptoms: in particular, peripheral neuritis. Similar doses of niacin given to healthy subjects do not produce peripheral neuritis. Thus under certain circumstances niacin is the "cause" of peripheral neuritis. Under different circumstances the same causative factor, niacin, does not produce peripheral neuritis. Furthermore the same syndrome, peripheral neuritis, can be "caused" by thiamine deficiency under certain circumstances. Administration of thiamine to pellagrins whose peripheral neuritis has been "caused" by niacin does not alleviate their neuritis.[8] Not only is niacin therefore a "cause" of peripheral neuritis under certain circumstances but not others, but peripheral neuritis can occur without any reference to this "causative" factor, niacin.

In order to generalize from such data to gain understanding of other diseases, particularly the diseases of contemporary industrialized society, a more useful model would appear to be the open-system model suggested as applying to both physics and biology by von Bertalanffy.[9]

One of the cardinal features of such a model is that any specific stimulus may lead to a variety of reactions, depending upon the circumstances. Conversely any specific reaction may have as its antecedents a variety of stimuli. Given such a reaction the circumstances under which the antecedent stimuli act thus become as important to our concept of "cause" as the stimulus itself. This open-system model thus provides for the general field of biology the concepts that the field and Gestalt theories have provided for psychology, and the patternist or configurationist theories for anthropology.

Within such an open-system model we may then view health and disease as "phases of life, dependent at any time on the balance maintained by devices, genically and experientially determined, intent on fulfilling needs and on adapting to and mastering stresses as they may arise from within the organism or without" (J. Romano, quoted by Engel[10]). Health then represents the phase of successful adjustment, and disease the phase of failure. Furthermore as suggested by Caudill:[11] "Stress can manifest itself in one or more of a number of linked open systems, and strain on one system can be transmitted to others, so that several become involved in the process of adaptation and defense." These linked open systems may be thought of as the biochemical, physiological, psychological, social, and cultural.

It is within such a model that epidemiology in our opinion has its greatest contribution to make in producing evidence of the relationship between strain in the various systems and alterations in the state of health under study.

Working within a closed-system model in which demonstrable changes in the biological systems alone are ascribed as causative, epidemiological data can at best be analyzed to provide clues as to such etiological factors.

Working within a linked open-system model, however, epidemiology can capitalize on its unit of study, the group. Such a unit makes the epidemiological method a fruitful field for the generation and subsequent testing of hypotheses regarding the social and cultural processes of significance to health. Analysis of these data may in addition provide clues as to the physiological and psychological processes involved, but such clues cannot usually be tested by epidemiological techniques alone.

The classic studies of Goldberger are perhaps the best single illustration of this point.[12,13] On the basis of epidemiological investigation Goldberger disproved the then current theory that an infectious process was involved in the genesis of pellagra. His analysis indicated that a behavioral process, the dietary practices, could explain the distribution of the disease. In subsequent epidemiological investigations he was able to test and prove this hypothesis and develop clues concerning the precise nature of nutrients involved, as well as the metabolic processes. These clues were further examined by laboratory methods, and the role of niacin deficiency in pellagra was established. This more specific hypothesis was now amenable to further epidemiological testing that indicated, as mentioned above, that niacin deficiency did lead to pellagra but only in the presence of a corn diet.

According to our view then, epidemiology may be regarded as one of the diagnostic sciences. Its aim is to derive hypotheses concerning the nature of the processes determining the state of health of a group. Its techniques consist of determining through the application of scientific method the associations existing between the state of health under consideration, the characteristics of the group being studied, and the habitat in which the group lives. Analysis of such meaningful associations permits the derivation of hypotheses.

If these concepts are acceptable, then further advances through epidemiological analyses will be dependent upon improved conceptualization in two areas: (1) the development of more satisfactory indices to describe the health status of the unit of study of epidemiology, the group; and (2) the development of a more adequate theoretical framework identifying the categories of social and cultural processes of relevance to health.

Our thinking on these two points is as yet tentative, and the following ideas are advanced primarily to promote discussion and solicit ideas.

The Health Status of a Group

There is general agreement in the biological and social sciences that in any complex unit the whole is greater than the sum of its parts. Attempts to describe an attribute of the whole solely by addition of the component parts are generally unsatisfactory as these ignore the pattern of relationships or interaction between the parts.

This concept poses problems in the diagnosis of the functional efficiency or state of health of units such as cells, organs, or individuals. It becomes particularly acute when the unit of study is enlarged to the size of a group of interacting individuals. The number and variety of disciplines with a contribution to make to a study of groups account for a considerable part of this difficulty.

In our present state of knowledge, attempts to integrate concepts derived from medicine, including psychiatry, sociology, and anthropology, for example, have not as yet proved too successful.

It is therefore not surprising that the existing health indices widely used in epidemiology are limited to summations of the diagnoses of each individual member of the group. There is little question that such a summation is an essential first step. Additional indices that reflect the health patterns and quality of interactions between members of a group are urgently needed.

In an attempt to overcome this difficulty we have to consider initially the types of indices available to diagnose the health status of an individual. In any diagnostic scheme the differing units of measurement and techniques available necessitate the separation of health into its physical, psychological, and social components. We are aware that in concrete reality these components are not separate, but for purposes of study it is useful to obtain operationally separate indices in each of these areas.

As an initial step in the determination of the health status of a group, we are suggesting that four categories of indices will be needed.

(1) Indices measuring the occurrence of specific disease states according to acceptable diagnostic classifications. Such measurements are usually expressed in terms of incidence and prevalence.

(2) Measurements of physique, including growth and nutritional status and selected physiological variables (for example, height, weight, and level of serum cholesterol).

(3) Assessment of selected psychological attributes. Guided by a modification of Selye's theory,[14] these attributes may be viewed in terms of:

(a) The adaptive capacity of the individual to resist noxious stimuli. This would include estimates of resourcefulness, flexibility, and ego strength.

(b) Indices of immediate discomfort in response to noxious stimuli. Reported feelings of tension, anxiety, anger, unhappiness, and alarm would be included in this category.

(c) Defensive reactions such as denial, repression, projection, displacement, and perceptual defenses.

(d) Pathological end states, other than those included under specific disease categories. Chronic anxiety, chronic generalized anger, and chronic despair, together with test measures of disturbed reality testing, inappropriate or uncontrolled affect, and other signs of disintegrated ego function could be regarded as appropriate indices for this area.

(4) Indices of social adjustment. The adequacy with which a person fulfills his social roles in terms of community expectation may be regarded as a useful operational definition of social adjustment. This role behavior can be assessed within the family, peer group, and occupational setting and in relation to the legal and other official institutions of the community.

In each of these settings three axes of adjustment can be discerned: (1) isolation—participation; (2) conflict—harmony; and (3) dependence—independence. These are the styles or qualities of the individual's role-fulfillment.*

The first three of these indices, incidence and prevalence, measurements of physique, and psychological attributes, are of course summations of individual diagnoses. Measurements of social adjustment, being by definition an index of interpersonal relations, include the concept of the interrelations of the parts being an important component of the diagnosis of the whole.

To accomplish this same objective for the first three categories of health indices, we are exploring the possibility of describing their patterning in addition to the more usual methods that describe their magnitude. By patterning we mean the configuration of health attributes that occur within a defined group. This includes the degree to which group members resemble each other in a particular health attribute more than they resemble similar individuals outside of their group, and it is essentially an analysis of variance model. This concept can be most clearly illustrated by considering small groups, such as the family, as the unit of study. For any health index that can be scored as a continuous variable (such as level of blood pressure) we would measure the degree to which family members deviate from the community norm for their age and sex. Families in which all members have similar deviations would have a high homogeneity score. Families in which there are marked differences in the deviations of members from the community norms would be given a low homogeneity score (that is, heterogeneous).

Utilization of such an index allows for the systematic exploration of differences between groups with homogeneously high indices, homogeneously low indices, and heterogeneous indices. In addition it would separate individuals with similar health indices, some of whom belong to homogeneous families and some to heterogeneous. Such explorations might well yield fruitful hypotheses to the effect that different processes are involved in determining health state under differing group circumstances.

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* These axes run parallel with Horney's[15] three types of human relatedness: moving away, moving against, moving toward. The concept of independence has much in common with E. H. Erikson's "autonomy."

Health: Relevant Social and Cultural Processes

The thesis developed in this paper is that epidemiology as a diagnostic science has a role to play with respect to its unit of study, analogous to the role of pathology, for example, with respect to its own unit of study.

Each science is concerned with a determination of etiological processes but at different levels of organization. Pathology is concerned at the cellular, tissue, organ, organ system, and organismic level, and epidemiology at the organismic, familial, societal, and cultural level. Both sciences utilize scientific methods to collect data, determine the associations between variables, derive hypotheses as to etiological processes and, subsequently, to test these hypotheses. Pathology, however, has a marked advantage over epidemiology. At one level of abstraction the etiological processes of concern to pathology have been relatively clearly conceptualized and categorized. It is thus possible on the basis of pathological data to postulate, for example, that an inflammatory or neoplastic or metabolic process is involved. While uncertainty still exists concerning the nature of the processes determining some of these pathological processes, at this first level of abstraction the existence of an acceptable, finite group of determinant processes is of inestimable value in deriving inferences from pathological data.

By contrast no unified body of theory exists within the social sciences categorizing the health-relevant social and cultural processes. Sociology and anthropology have provided structural schemes in abundance, but there is little agreement as to which processes are relevant to health, how many crucial processes there are, and how these processes are linked to the health states of individuals and groups.

As a potential contribution to this area we are proposing an epidemiological study of the health correlates of culture change. Specifically we shall be concerned with culture change as manifested by a change from a rural agricultural to an industrial way of life. By determining the association between changes in health status and selected changes in the social and cultural characteristics of the groups involved, we hope to be able to test the usefulness of the conceptual scheme outlined below and to provide data for the derivation of additional hypotheses.

In a comparison of groups undergoing culture change with those not undergoing such change, two additional sets of variables must be controlled as far as possible.

(1) Racial or genetic variables. If the groups changing from an agricultural to an industrial milieu differ racially from either the rural or the stable industrial population, any differences in health status discovered obviously cannot be necessarily ascribed to cultural changes.

(2) "Selection" variables. The possibility, which always plagues studies of this sort, exists that groups who migrate do so as a result of differential adjustment or health status. According to this thesis such people would have different health indices from others in their society, whether they migrated or not.

In an attempt to avoid these twin pitfalls, we propose to carry out such a study in a small industrial city of about 5000 people situated in the Appalachian Mountains of a southern state. A little more than 50 years ago that city was a mountain village of no more than 100 people. In 1907 a large national corporation located a manufacturing plant in the village and, by deliberate management policy, drew its labor force entirely from the surrounding Great Smoky Mountain area.

This policy continues to the present, the factory still drawing its labor force almost exclusively from the native population, almost entirely of Anglo-Saxon stock. The plant currently employs more than 3000 workers, with less than 3 per cent labor turnover per year. Within this area it is thus possible to identify three groups for comparison purposes.

(1) A group of rural mountaineers still pursuing a predominantly agricultural way of life.

(2) A group of first-generation factory employees. This group, the children of farmers, will be the group that has most recently undergone culture change.

(3) A group of second- and third-generation factory employees, children and grandchildren of previous employees.

As each of these groups is composed of people of identical racial stock, any health differences discovered cannot be attributed to marked genetic differences between the groups. The possibility of selection can be controlled, at least partially, by determining whether migrants who have most recently undergone culture change have a poorer health status than migrants who underwent such change a considerable time ago. In a subsequent study, attempts will be made to determine the health status of individuals prior to employment in the factory and to follow them for a number of years subsequent to employment.

In this community we propose to test the following two hypotheses:

(1) That the process of culture change, as manifested by rural migration to an industrial area, will be associated with changes in health status. The group experiencing culture change will have higher indices of poor health and adjustment than the group that has not experienced the change or the group that experienced the change more than a generation ago.

(2) (a) The association between culture change and poor health and adjustment will be maximal in those families in which there has been least sharing of the process of change and in which there is least solidarity.

(b) Upward social mobility will accentuate the association between culture change and poor health and adjustment.

The general proposition underlying this study is that the process of sociocultural change as manifested in migration from a rural to an urban industrial setting raises the probability of incongruity between the culture of the migrant and the social situation in which he lives. Such incongruities place excessive adjustive burdens on the social groups in which the migrant interacts and on the personality systems of individual migrants. In so far as these stresses are not absorbed by small group systems and/or the personality system, recent migrants to the industrial city are likely to manifest increased rates of psychological, somatic, and social ill health.

Following leads provided by Geertz[16] in his study of rapid change in Java, we feel that it is necessary to analyze explicitly the complex category "sociocultural system" into its cultural and social structural components and to treat them as separate variables and yet recognize their mutual interdependence. Distinguished from social structure, culture may be viewed as an ordered system of meaning and symbols in terms of which social interaction takes place. It is the framework of beliefs, expressive symbols, and values in terms of which individuals and groups define their world, express their feelings, and make their evaluations. It is the fabric of meaning in terms of which people interpret their experience and guide their action. Social structure is another abstraction from essentially the same data: human social behavior. It is the way that group life is ordered, the persistent and regular social relationships of people.

Following the work of Sorokin,[17] Geertz has pointed out that culture and society differ in their mode of integration. Cultures tend to be integrated in a "logico-meaningful" manner, along the axis of internal consistency of parts. Social structure, on the other hand, is characterized by quite a different mode of integration that Sorokin calls the "causal-functional." Here each part of the social structure is an element in a "causal" chain which keeps a social system going. The analogy is organismic rather than "meaningful."

The functions of culture and those of society are thus judged by different criteria. A particular part of the social structure is said to be functional in so far as it contributes to the continuing life of the total social system. A social structure, such as that of a delinquent gang, is said to be dysfunctional in so far as it subverts the operation of the larger social system.

Analyses of the functions of culture tend to take two forms. Culture is viewed as functional in so far as it provides the individual with a meaningful framework for facing life and meeting his physical and psychic needs. Secondly, cultural functions are related to the preservation of the social structure, and through social structure to the meeting of the needs of individuals. Thus culture is seen as the "charter" of the social organization, symbolizing and reinforcing the values in terms of which a group organizes its social life. By operating to reinforce social ties and to preserve the social structure, culture functions to meet the needs of individuals. Dysfunction in culture is usually analyzed in terms of processes leading to the disintegration of the unity of the system of meanings, to the ambiguity of meaning, and to the weakening of commitment to beliefs, symbols, and values.

In order to derive more specific hypotheses as to the social and cultural processes relevant to the postulated changes in health, we draw upon Redfield's ideal-typical model of the rural-folk culture.[18,19] According to this model, which has proved widely useful in crosscultural comparative studies, the rural-folk culture is found in small, relatively isolated, and relatively homogeneous communities. Under these circumstances every adult could know every other adult on the basis of long-continued personal interaction. This local community tends to be a self-contained, self-supporting universe, relatively separate from others. Traditions tend to be stable, and the pace of change slow. These groups are isolated from the changing thought of the outside world. The most important values organizing life tend to be implicitly held, taken for granted, and sacred in the sense that they are not subject to challenge or criticism.

We expect this model to be useful in the empirical analysis of the culture that migrants bring with them to the city. A culture of the rural-folk type may have provided the migrant and his ancestors with a design for living quite appropriate to the social situation of the folk community, but a culture adapted to rural life may increase rather than decrease the stresses of the rural migrant to an urban situation. Accumulating evidence of the industrialization process in many parts of the world, recently synthesized by Kahl,[20] has provided us with a model of urban industrial social forms for which there is some evidence of universality and functional necessity. If this is true, we have a model of industrial social structure that will be highly useful in assessing the appropriateness of culture patterns to social forms and in working out the social and cultural processes significant for the determination of the health and disease states of rural migrants.

According to this body of thought the culture of the industrial city is not simply "disorganized" and "secularized," as might be predicted by the Redfield scheme, and its social structure is not simply "individualized." The culture of the city is highly organized on different principles. The urbanite is not cut loose from all group controls over his behavior, but tends to be a member of many groups rather than one all-encompassing group. He has not lost all commitment to values but has become committed to values more appropriate to the urban industrial situation. Thus we feel that the health-relevant processes will not be found by analyzing cultural disorganization and secularization apart from the relevance of the culture brought to industrial society by migrating groups. Nor should we analyze the breakdown of group controls without assessing the appropriateness to the current situation of the traditional values to which these folk groups are committed. In essence our analysis of social and cultural processes relevant to health revolves about the question: How effectively has the past experience of this group equipped it to cope with its present life situation?

For purposes of identifying the health-relevant social and cultural processes, we propose to concentrate on three aspects of industrial social organization that appear most likely to be stressful to the carrier of a folk culture: (1) occupation, (2) family, and (3) social class.

Occupation. The rural community tends to be a large group of kinsmen, and kinship tends to be the cement that holds the social structure together. The social structure of the city, however, tends to form on occupational division of labor. The cultural norms organizing this occupationally-dominated social system are quite different from those which the folk migrant has internalized in his native situation. In the first place his job takes him away, during the working hours at least, from his family and from the kinlike community in which social relationships were supervised by the folk-normative system. Contacts between people in the city tend toward the impersonal contact of men in their specialized roles rather than the affectively-involved contacts of total personalities. Social relationships with others tend to be superficial, based upon businesslike, "rational" norms. On the job itself the individual finds personal security and tends to be evaluated in terms of his productive skills rather than on the basis of his extended family membership. Standards are specific to the individual and his job, and the diffuse norms of the family are functionally inappropriate to the factory.

The urban-industrial social system is based on cultural norms of impersonal concern. Evaluation is based on possession of attributes and goods and on individual performance. It has often been held that this social system is necessarily deleterious to the health states of individuals and groups because of the intense and individualized competitiveness invoked. We feel, however, that this system is unduly stressful only when it is not supported by cultural norms appropriate to such a system. Some evidence for this point of view may be found in the recent work of Lee and Schneider.[21] Contrary to much current thinking that predicts that essential hypertension would be higher in deadline-meeting top executives, top executives in industry were found to have lower rates of essential hypertension than minor executives. Interpreting these findings in terms of our hypotheses about the importance of congruity or "goodness of fit" between culture and social situation, we would hypothesize that the family and neighborhood groups of the high-status top executives, which had probably been urbanized for several generations, had passed on to their members a set of cultural beliefs, symbols, and values which provided a relatively meaningful and satisfying design for living in a competitive, impersonal, bureaucratic social setting. The families of the minor executives, which may have derived from lower social status, had perhaps not developed or transmitted norms that "immunized" their members against the potentially deleterious effects of clawing their way up the hierarchy of an industrial organization.

In terms of this hypothesis we expect the health states of second- and third-generation residents of our Appalachian industrial city to be better than those of the recent migrants, due to the development and internalization of cultural patterns more appropriate to the urban-industrial social setting.

Family. Throughout the modern world the development of urban-industrial society has tended to be destructive of the extended family and the various forms of relations with kinsmen outside the nuclear family. This form of society has tended to reduce the economically productive functions of the family and to change it into a consuming rather than a producing unit. Technological change and industrialization have tended to equalize the social power of the generations and of the sexes, destroying the authority basis of the extended family and tending throughout the world toward the isolated nuclear family, the structure of which is more compatible with urban-industrial life. The isolated nuclear family, centering its functions on sex, companionship, and the socialization of the young, may be of crucial importance for the members of an industrial society as a buffer against the impersonal, competitive, occupational world. In the terms of Henry[22] the family may be the most important provider of a "personal community"—a group of people on whom one can rely for total acceptance, support, and approval in intimate and satisfying ways. The break from rural life that is implied by migration from the countryside to the industrial city may place a heavy load on the isolated nuclear family as a system of defense. With reference to the man who takes a job as a factory worker, a heavier load may be placed on his wife, who may be required to support her husband, particularly in meeting his dependency needs, in ways for which she had not been prepared by her own rural life. In order to test this hypothesis in our Southern industrial community, we might compare the states of health of men who migrate with their families and the health states of married men who migrate without family. It might also be possible to compare the health states of men whose wives may be classified as emotionally supporting and men with "nonsupporting" wives.

Adjustment problems posed by migration and change have long been explained with the concept of "culture lag,"[23] referring to the failure of the parts of a culture to maintain their internal consistency during periods of change. The failure of the family to transmit a coherent set of beliefs, expressive symbols, and values may usefully be analyzed with this concept. However, we propose another concept that may be just as useful: the concept of "social lag." Knowledge of the functional requisites of an industrial society[20,24,25] permits us to posit certain social forms as functionally out of phase with the demands of this kind of social organization. While some continuation of the extended folk-type kinship relations may be functional as a temporary buffer against the stresses of migration to the industrial city, the long continuation of extended forms of the family may be regarded as dysfunctional in urban-industrial society. Some of the health and adjustment problems of lower-class people in industrial cities, who tend not completely to have made the transition to the nuclear family, may be subject to interpretation in the light of the "social lag" hypothesis. It is possible that the very form of these lower-class families tends to unfit their members for adequate functioning in the new type of social reality. The frequent breakdown of parental control over adolescents among first-generation urban families may be due to the fact that the norms transmitted by the parents are actually poor guides to the life of the city.

Social class. Much of the stability of the industrial city is dependent upon the social-class system. Public opinion in cities tends to be a series of opinions, each adapted to a particular level of the class system. This is very different from the firm body of relatively homogenous tradition that tends to maintain social control among the folk. While the folk community tends to be composed of either a single kind of people or a sharp gradation of people into two or three stratification categories, the industrial urban-class system operates on a complex set of gradations based upon criteria such as occupation, education, and style of life.[26]

If we are to emphasize the health implications of the emerging class system, rather than simply focusing on the effects of the disintegration of the old one, we need to consider the cultural norms underlying an urban-industrial class system. In the industrial milieu, the failure of society to build the values of individual responsibility into its members may be considered a functional failure; but the failure of society to provide the milieu in which individual achievement and social mobility values can be carried into meaningful and satisfying action may be considered another instance of stressful "social lag," with potential health relevance. The literature has provided us with an abundance of situations of this type, for example, the "marginal man" studies such as that of Vogt[27] on the Navajo veterans of World War II. Many of Vogt's Navajo veterans had been adequately socialized in values of individual achievement and responsibility, but the social situation to which they returned after the war denied them the right to occupational achievement because they were "Indians." Such studies furnish us with much suggestive evidence of the deterioration of social adjustment of "marginal men." Since the problems of these studies are not posed in health-relevant terms, however, we have inadequate data to test hypotheses about somatic and psychic health states. Posing these problems within an epidemiological framework will, we hope, remedy this situation in the near future.

References

1. Chapin, C. V. 1928. The science of epidemic diseases. Scientific Monthly. **26:** 481.
2. Frost, W. H. 1928. Epidemiology in Nelson Loose Leaf system. Preventive Medicine and Public Health. Nelson. **II.** New York, N.Y.
3. Flexner, S. 1922. Experimental epidemiology. J. Exptl. Med. **36:** 9.
4. Gordon, J. E. 1949. The epidemiology of accidents. Am. J. Public Health. **39:** 504.
5. Gordon, J. E. 1958. Medical ecology and the public health. Am. J. Med. Sci. **235:** 337.
6. Frost, W. H. 1936. Introduction to Snow on Cholera. Commonwealth Fund. New York, N.Y.
7. Aykroyd, W. R. & M. Swaminathan. 1940. The nicotinic acid content of cereals and pellagra. Indian J. Med. Research. **27:** 667.
8. Gillman, J. & T. Gillman. 1951. Perspectives in Human Malnutrition. Grune and Stratton. New York, N.Y.
9. von Bertalanffy, L. 1950. The theory of open systems in physics and biology. Science. **111:** 23.
10. Engel, G. 1953. Homeostasis, behavioral adjustment and the concept of health and disease. *In* Mid-Century Psychiatry. : 33. R. Greiker, Ed. Thomas. Springfield, Ill.
11. Caudill, W. 1958. Effects of social and cultural systems in reaction to stress. Social Science Research Council, Pamphlet No. 14. New York, N.Y.
12. Goldberger, J., G. A. Wheeler & E. Sydenstricker. 1918. A study of the diet of nonpellagrous and pellagrous households in textile mills in South Carolina in 1916. J. Am. Med. Assoc. **71:** 944.
13. Goldberger, J., G. A. Wheeler & E. Sydenstricker. 1920. A study of the relation of diet to pellagra incidence in seven textile-mill communities in South Carolina in 1916. Public Health Rept. **35:** 648.
14. Selye, H. 1956. The Stress of Life. McGraw-Hill. New York, N.Y.
15. Horney, K. 1945. Our Inner Conflicts. Norton. New York, N.Y.
16. Geertz, C. 1957. Ritual and social change: a Javanese example. Am. Anthropologist. **59:** 32–54.
17. Sorokin, P. 1937–1941. Social and Cultural Dynamics. 4 vols. American Book Co. New York, N.Y.
18. Redfield, R. 1941. The Folk Culture of Yucatan. Univ. Chicago Press. Chicago, Ill.
19. Redfield, R. 1953. The Primative World and Its Transformations. Cornell Univ. Press. Ithaca, N.Y.
20. Kahl, J. A. 1959. Some social concomitants of industrialization and urbanization. Human Organization. **18:** 53–74.
21. Lee, A. E. & R. F. Schneider. 1958. Hypertension and arteriosclerosis in executive and non-executive personnel. J. Am. Med. Assoc. **167:** 1447–1450.
22. Henry, J. 1958. The personal community and its invariant properties. Am. Anthropologist. **60:** 827–831.
23. Ogburn, W. F. 1922. Social Change. Viking Press. New York, N.Y.
24. Aberle, D. F., A. K. Cohen, A. K. Davis, M. J. Levy, Jr. & F. X. Sutton. 1950. The functional prerequisites of a society. Ethics. **60:** 100–111.
25. Theodorson, G. A. 1953. Acceptance of industrialization and its attendant consequences for the social patterns of non-western societies. Am. Sociol. Rev. **18:** 477–484.
26. Kahl, J. A. 1957. The American Class Structure. Rinehart. New York, N.Y.
27. Vogt, E. Z. 1951. Navaho Veterans. Papers of the Peabody Museum, Harvard Univ. **41**(1).

RURAL HEALTHWAYS IN NEW MEXICO*

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The healthways pattern described in this paper is not particular to any specific village, although it is basically a village pattern. It is that of a village invented for our purpose. In the northern counties of New Mexico, and in the Conejos and San Luis Valleys of southernmost Colorado, a rural neighborhood—a village—is called a *placita*, and that is the name of this invented village, La Placita. La Placita is hopefully a modal prototype representative of a larger population of such villages. The pattern of health-disease related traits described for La Placita will be found with greater or lesser similarity in the geographical area described above. There is no such place as La Placita: there are no such people as *placiteños*, but there are many places with people like them.†

The composite La Placita is based on an examination of source materials[1-19] and on a one-and-one-half-year's recent exploratory field work.‡

La Placita is within easy driving distance of Espanola, N. Mex., an old cluster of villages now grown to town status, and of Santa Fé, the New Mexico state capital. Most of the way to either place is over a paved highway, but the approach to the village is on a graded but unpaved road sometimes difficult or impossible to traverse after a heavy snow or a flash springtime deluge that occasionally is experienced in this area. It had been traditionally an agricultural community (but now most of the able-bodied men and even some of the women do wage work in nearby towns and cities or bordering states). It was settled shortly after the American Revolutionary War. The irrigation system of its founders—including several hand-hewn flumes of wood—is still in use.

"Old-timers" in the village say that there has been no major change in either its appearance or in the composition of its families during their lifetimes. In fact some of them remember their fathers saying the same thing. A glance at the colonial Spanish and Mexican archives in Santa Fé show property transactions, petitions of various sorts, old maps; and the names and places on these documents are familiar today.

La Placita is one of a group of villages in the Rio Grande watershed tenaciously held for centuries by Hispanic colonists and their descendants in spite of great human and natural obstacles. These were the last outposts of colonial

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† In an area such as that of Hispanic New Mexico, where almost all geographical and population entities have names, the term *placita* is encountered at every hand as a rural neighborhood name (such is also the case with *llano*, *rancho*, *valle*, *vega*, *arroyo*, and other ubiquitous designations). As postal or railroad services were extended to many of these population clusters, local designations gained official legitimacy. Thus there are actually several villages with the term *placita* (or a variant of the term) as their legitimate names or as part of such names. The village described in this paper is not one of these: it is a fictional entity.

‡ This presentation is not meant to be a synthesis or evaluation of data gathered during the course of a field project. At this writing data-gathering is still the project's most important activity. This paper represents a "skimming" of the coded data, and elaboration is perforce descriptive and tentative. A more complete report is planned for 1960 or 1961.

Spain in the wilderness, virtually without communication with the outside world and visited only occasionally by trade and military caravans from Mexico. The threat of annihilation from hostile Indians and even from the quiescent Pueblos was constant. In 1786 Bernardo de Galvez, considering the defensibility of his most northern ward, noted that ". . . the province is very distant and surrounded in all directions by different enemies."[20]

From its founding, La Placita has been a poor village, its inhabitants existing at a marginal level. Class distinctions have always been few. There have been a couple of families who were thought of as *ricos*, but they lived in homes like those of everyone else, perhaps a bit larger, perhaps with less crudely made furniture. *Placiteños* have usually asked little beyond existence from the land; the land has given them little more. In spite of being cut off from others, of the threat of savage extermination, of minimal productivity of the land, La Placita and *placiteños* have continued to exist over the generations.

Of such villages Saunders[14a] wrote: "The rhythm of life was slow. The pattern of activity was governed by seasonal rather than daily changes. Nothing in the daily routine was very compelling as long as the seasonal activities of planting, crop-tending, and harvesting were carried on. The rate of social change was also slow. One year was much like another year, and there was no need to be much concerned about time. The focus of attention was the present. There was nothing very memorable in the past to be recalled. There was no particular expectation of the future. Villagers lived in the present and did what needed to be done or what was pleasant to do at the time they were necessary or pleasant."

In virtual isolation, with a high degree of interpersonal and intrafamilial dependence, and with the maintaining of a system of continuously reinforcing norms of behavior, La Placita—along with its sister villages—developed a distinguishable and specific subculture, "folk" in nature.

In the *placiteño* subculture its institutional or sociocultural complexes were related directly to analogous complexes of Mexico or of the larger Hispanic world; in addition it possessed peculiarities and modifications of its own. This is seen in institutional complexes such as those of church or home, or in sociocultural complexes such as those of property and inheritance, language and communication, health and disease.

The health-disease complex of La Placita has its roots in medieval Spain and precolonial America, and it is closely related to those of other areas of the Hispanic New World where similar admixtures have been made. Belief in the harmful power of *ojo* ("the eye") is common to all southern Europe and Hispanic America; belief in the protective power of the *oshá* root is probably restricted to the high areas of New Mexico and southern Colorado (with some diffusion along the present United States-Mexico border); belief that the water of the Rito de la Placita, taken with wine early in the morning, will lessen the joint pains of *rumos* is probably restricted to La Placita and one or two neighboring villages.

Factors contributing to major cultural change were limited during the entire Spanish and Mexican periods in La Placita. With the introduction of "American" ways after the acquisition of New Mexico by the United States in 1846 the factors affecting change increased geometrically. Until about 30 years ago the *placiteño's* medical system was relatively static and traditional. In recent decades the traditional system has been challenged, at times invaded, by segments of the modern medical community. On the other hand, the traditional system has been stubbornly retained by some *placiteños*: even when there has been a surface acceptance of the tenets of scientific medicine, under that surface there remains a core content of traditional beliefs and behaviors. There are a few *placiteños* who accept modern medicine completely, or as completely as village culture will permit, although any degree of sophistication regarding its true nature is either lacking or minimal. These few accept and defend modern medicine because they have seen it work.

With some very broad strokes of the brush I shall try to delineate some of the major facets of the health-disease complex of La Placita.

In this village there are about 100 nuclear families, almost all living close to or sharing a common yard and well with their neighbors, related by blood or marriage. They live in homes of adobe, sun-dried mud-straw bricks. Most houses have flat roofs with a thick layer of adobe to hold them down; a few have pitched roofs of corrugated iron. Rooms are few. Beds are shared: by a conjugal pair, or by such a pair plus an infant, or by siblings, or by grandparents and grandchildren. In some homes the children sleep on individual soft sheepskins on the hard-packed mud floors. Heat is supplied by a small cast-iron stove and, perhaps, by a corner fireplace. In many homes cooking is still done on a large kitchen wood stove. Here the fuel is wood: chiefly dead *piñon* gathered in the local national forest. A few homes have stoves that burn propane or butane. Windows and doors are few; they are left open during the day, closed tightly at night.

Placiteños like to keep their homes neat and orderly. Furnishings, curtains, pictures, and portraits have their specified places and are carefully rearranged if disturbed. The women of the village frown on a poor housekeeper. Not one house in La Placita has a porcelain bathtub, but periodic bathing by bucket is required of all family members. To be clean is a mark of propriety, especially on social occasions such as visiting, receiving visitors, or going to church. It is also considered proper esthetically. A flimsy wooden "privy" behind or at the side of every home in the village is the only means of serving its members' evacuation needs; it is generally unscreened. Most homes have electricity, used chiefly for illumination. Water for drinking is obtained from the family shallow well. There are a few families in La Placita who still get their water for potable purposes from the irrigation ditch that circles the village, but this is considered "less convenient" than a well. For more than 40 years villagers have talked about a community water supply system. Such talk has been revived recently. The village may cooperate with the state's department of public health in the digging of a community deep well and the construction of a water supply system attached to it. Many of the village's housewives approve such a move. With electricity and piped water, a washing machine may be more than just a dream.

Placiteños eat simply but well. Meat is not a frequent item on the family's table, but many foods are liberally laced with lard. Sun-dried strips of beef or mutton (or even of venison) are occasionally cooked into more routine table fare. Tinned foods or "store-bought" foods are now used often, but the bulk of any meal is likely to consist of locally grown and preserved products: corn, beans, fruits. An almost indispensable food, grown locally and eaten in large amounts, is chile. Some *placiteños* have taken to certain *gringo* foods and have them meal after meal: coffee, fried potatoes, packaged desserts. Candy and soft drinks are markedly popular with children in the village (who typically have large numbers of dental caries).

Neighboring villages think that La Placita is a quiet place, not given to exuberant or loud affairs. One may hear at a local dance in one of the villages a young man say to his date, "*No seas placiteña*" (roughly translating: "Don't be a stick-in-the-mud, like those from La Placita. Perk up, now."). Interestingly enough, *placiteños* say similar things about people from neighboring villages. Excessive emotionalism is frowned upon, but the sometimes unusual behavior of a *loco* is tolerated. Mental illness as understood by the modern medical community is poorly understood by *placiteños*, although they may believe that a wide spectrum of illnesses has its origin in psychic or emotional stress, or "fright." One may be "outside of his mind" if he is constantly deviant in behavior or if he is markedly retarded but, unless such behavior is antisocially directed, sanctions, coercions, and treatment are not used. (If, however, witchcraft is suspected of bringing about aberrant mental states, highly specialized treatment may be sought.) The mentally retarded and the mentally ill who from time to time are found in La Placita are usually enveloped and protected by their families. Institutionalization of a mentally afflicted family member is an alternative rarely sought. There is presently only one child who comes from La Placita in the state home for retarded children, and he was not entered until he was 16, when his family thought he was physically unmanageable. However, there are several *locos* (wild or bizarre ones) in the village; they do not do anything of consequence, but they do not usually hurt anyone either.

It is deemed necessary in La Placita to take precautions in daily life to avoid sickness and harm, but there is no well-constructed system of preventive medicine. Precautions may be generalized (that is, "Don't go out into the night air because you will get sick") or highly specific (such as, "You should carry a small bit of dried *oshá* root with you, and rattlesnakes will not strike you"). Children in La Placita go to a consolidated school in a neighboring village, and the county health nurse comes around periodically to give them "shots" to keep away diseases. Some of the old-timers have never liked the idea of these young women coming around with their needles and puncturing the skin. It is not a natural thing to do, but most *placiteños* offer no such objection. Some understand that the "law" demands that "shots" be given. Some others have observed within their own families that since the shots there have been definitely fewer deaths from whooping cough, dyphtheria, and other diseases among the children.

A healthy person in La Placita is one who looks healthy and acts healthy. A healthy child, hence, is one who is plump and rosy; he should also be physically active and eat well. A healthy adult is one who is well proportioned, well muscled, well colored, and who does a good day's work. *Placiteños* are seldom obese, but the occasional heavy-set person is considered to have decided health advantages over the more thinly put together person. A few families are firm believers in vitamins and tonics, but most others see little use in such preventive medications.

A sick person in La Placita is one who is unable to perform the routine functions of daily life. If, furthermore, he loses color and strength and goes to bed, sickness is even more definite. Typically the *placiteño* tries to ascribe a name to an illness so that he may take the necessary steps to minister to the afflicted. It is only a rare case when an affliction is seen as incurable; in the vast majority of cases an illness has a cure. It is a basic assumption among *placiteños* that something, however minimal, must be done to cure an illness that is curable.

There are two essential steps in the curative process: (1) naming or identifying the disease entity, and (2) treating it. Although the process may not be fully conscious or deliberate, the *placiteño* will seek to resolve certain key questions about an illness.

What kind of illness is this? Although the lines of division among causative and symptomological patterns are indeed hazy, an initial attempt is made to classify an illness into some part of what seems to be a threefold typology: physical, emotional, magico-religious.[21] The therapies and therapists could differ markedly, depending on the disease type. An illness caused by overeating of green fruit can more than likely be handled by the administration of one of several empirically proven *remedios mejicanos* (a folk or home remedy); an illness caused by the unwitting magical power of a stranger over a child can be treated only by essentially magical procedure (that is, recovering the stranger and having him pass water to the afflicted child, mouth to mouth).

Is this an illness that is caused by an internal predisposition, or is the cause external to the afflicted? An internal cause of disease might include familial tendency, or heredity, or it might be something associated with such factors as age, sex, and stature. If it is external to the afflicted, is it self-engendered (that is, did he make himself susceptible by exposing himself to disease situations), or is it other-engendered (that is, was he "attacked" by an external agent)? If an external agent is responsible for the disease, what kind of agent is it: animate, inanimate, spiritual; base animal, human, spirit, God? If the agent is animate or spiritual, did it really intend harm? Is this possibly one of those rare diseases that have no known cause and hence have no known cure?

The *placiteño* will rapidly sift and sort the answers to these questions and to others like them and will select a name. It is quite possible that another *placiteño*, sifting and sorting the same responses, will come up with another name. Whatever the name or names, therapeutic procedures depend upon them. Associated with naming a disease is estimating its exigency: How important is it? How a disease is treated and how others relate to the afflicted will depend upon "how important" the malady is. (It is conceivably possible to arrange all possible afflictions as named by *placiteños* on a continuum of exigency from "slight" to "high," and a disease's location on that continuum would provide an accurate indication of the intensity and immediacy of treatment that it would be afforded.)

Placiteños rarely find that the etiology of an affliction belongs to any one single slot in their system of classification. Any single individual in the village may be "certain" that his evaluation is correct, but a collective view of all evaluations would probably show that only the relatively simple afflictions (such as overindulgence, skin abrasions, muscle soreness) show a high degree of agreement. More difficult afflictions (such as chronic disease, pain in nonobservable body parts, slowly progressive disease) would show greater variety in naming. In this village therapeutic procedures for minor ailments are usually simple, but for difficult ailments therapy may be quite complex and varied.

Almost every home in La Placita has a spot where herbs are kept.[22] These are usually gathered, dried, and stored by the woman of the house. In the old days the supplies were more varied than they are now, but even today the stocks of herbs may be considerable. Today both drugstore and grocery also have made noticeable additions to the folk pharmacopoeia, such as oils, linaments, patent medicines, and aspirins. Collectively the herbs and the medicine-cabinet items are the bases for innumerable *remedios*. In the case where an affliction is evaluated as minor, or where a *remedio* can be self-administered, the afflicted *placiteño* himself will prepare the brew, the infusion, the poultice, or the salve. He may ask others for their "pet" cures, prepare, and try them. Often the mother, grandmother, or grandfather may be referred to since one of these may have assumed the intrafamilial role of repository of herbal information. Within the family too, there may be a member who is well versed in the techniques or "has the touch" naturally of massage. In La Placita massage is more than a device for relaxation; it is a therapeutic technique. *Sobando* and *traqueando* (massaging and bone "cracking") are resorted to in most illnesses, from the simple to the highly complex.

If self- or other-administered *remedios* within the family do not suffice to treat an ailment, the afflicted may turn to special therapists. Within the folk culture there are several; within the modern medical community there are others. In La Placita there are two young wives and one very old man who are known as *sobadores*, outstanding therapeutic massagers. They will visit homes, or receive patients in their own homes, and perform required tasks. These may be done for a fee. Within the village there is another woman, a native midwife (*partera*), who is called upon for her special services by most of the expectant mothers.

In a neighboring village there is a woman who specializes in the preparation of herbal decoctions for sale or for a fee. In La Placita she is called a *médica*; further down the Rio Grande valley she might be termed a *curandera*. She is an herbal folk specialist. In other villages close by there are other women who are *parteras-sobadoras-médicas*, quite expert in all of the usual folk-curing arts. Almost all folk curers are women in these villages. An exception is an old man who lives "way over the mountain" from La Placita who is an *albolario* (or *arbolario*). He is an antiwitch. Not only can he use herbal arts well, but he has the power to say and do things that dispel the curses of witches or evildoers. He would be called upon only if bewitchment were suspected as the cause of illness. Sometimes even a *brujo* (witch) may be sought out to break a spell he has created. Interestingly enough, everybody in La Placita will talk about witches, but no one knows where to find one.[23]

There are those in the village, of course, who will go to a physician when they suspect that they are ill or when they experience no success with home remedies. Most *placiteños*, however, are reluctant to seek out physicians. In several nearby towns and cities there are practitioners of "modern" medicine ranging from chiropractors and naturopaths, through osteopaths, to medical doctors. When it is necessary to see a "doctor" most *placiteños* do not discriminate by title among these town branches of the healing arts. There is, however, a noted preference for chiropractors and osteopaths since both will manipulate muscles; moreover these practitioners seem to establish more friendly relations with *placiteños*. Medical doctors use strange equipment, speak strange words, "look at you and write prescriptions, and charge heavily for services," avow the *placiteños*. Their methods and tactics are the most alien to *placiteño* culture of all the "doctors."

Placiteños as a rule do not like to go to hospitals for any reason. The regimen of life is strange in a hospital. The food is too bland. The nurses and doctors see you only as a "case" and only spasmodically. Most important of all, a hospitalized patient is cut off from his family. To "Anglo" hospital workers it does not seem to make much sense, but patients from La Placita like to have their families nearby, even if they just stand silently in the hospital corridors. This kind of visiting is frowned on by hospital authorities. Then too, as everyone in the village knows, a hospital is meant for those who are very seriously ill; to go to a hospital admits of the utter exigency of an illness and of the inability of the folk culture to cope with it. A few in La Placita have been to hospitals, and they have verified all the bad things the villagers already knew about hospitals. The high cost of inpatient treatment also deters favorable attitudes toward hospitals.

Within driving distance of La Placita is the shrine of Our Lord of Esquipula in Chimayo, N. Mex.[24,25] Here in his small church the Black Christ is revered. In a wide hole in the ground of a tiny room off the church proper is the earth "which heals by faith." Every once in a while a small group will go down to the sanctuary, offer their prayers, and return with the holy earth. For some ailments it is taken in a draught, for others it is made into mud and plastered over an afflicted organ. There have been no miraculous cures among the afflicted in La Placita, but a cripple in a nearby village was so cured that he hung his crutches along with hundreds of others on the wall of the shrine, and now walks upright. A few *placiteños* say that the sanctuary earth has helped their chronic illnesses.

Once a month in the rural schoolhouse in La Placita (now unused because of a school consolidation program), a room is cleared, and a team of nurses and a doctor come up from the health department to examine babies. Mothers from about six other villages join the women of La Placita when clinic day comes. They sit in large and small groups and exchange gossip, family news, and recipes. The women and their children dress as well as they can. For some it is a very important social occasion. Although this is definitely a woman's affair many men come along; they drive the family automobile or pickup truck. The men gather in little knots outside the schoolhouse; some go down the road for a beer. Many of the women are proud of their children as they display them, plump and clean, to the medical people. The doctor says a child has fine muscles, and the mother beams. These "well-child" clinics are well attended, and there is not a baby in the entire village who has not been taken to the clinics at least occasionally.

A few of the people in the village go down to other clinics in the cities: chest clinics, clinics for "private" diseases. They do not enjoy these clinic visits as social functions. Some in fact try to delay going until there is no other alternative.

Two of the men in the village work for employers who insist that their employees subscribe to health insurance plans. The families of these workers are the only ones in the village who are covered by such plans. Some families on "welfare" have minimal medical coverage. The others prefer to pay for illness when it occurs and can see little benefit in health insurance that is "paying for illness before it ever comes."[26]

The only community health "programs" in La Placita are provided by two men's organizations (other than the irrigation ditch association): they are the local *morada* ("house") of the *Hermandad de Nuestro Padre Jesús* (the "Penitentes") and the *Mutua* (a mutual protective association of farmers). In the event of sickness, "brothers" of both organizations will aid their stricken members in any way they can. They can do least in the way of monetary contributions, since they are poor, but they can till a man's fields and harvest his crops, gather and split firewood for his family, share their own families' food. Should the afflicted "brother" die both groups are pledged to supply his widow and children with food, kindling, and clothing until they can be reabsorbed by their own families.

Summary

A hypothetical village in northern New Mexico—La Placita—has been used to evaluate descriptively the healthways of village-dwelling, rural Spanish-Americans. Through isolation a distinguishable folk culture, inclusive of a health-disease complex, has developed in this village and in others like it. Major aspects of the health-disease complex of this village mentioned here have been: hygienic aspects of home life, eating habits and diet, mental health, precautionary aspects of health, identification and treatment of disease, folk medicine, medical practitioners, and community health. Stressed has been the concept of multicausal factors in illness and of a corresponding multiphasic and possibly highly varied therapy.

Noted is the trend to include parts of the modern medical system as acceptable alternatives in therapy.

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References

1. Bunker, R. & J. Adair. 1959. The First Look at Strangers. Rutgers Univ. Press. New Brunswick, N.J.

2. Burma, J. H. 1949. Present status of the Spanish-Americans of New Mexico. Social Forces. **28**: 133–138.
3. Clark, M. M. 1959. Health in the Mexican-American Culture. Univ. Calif. Press. Berkeley, Calif.
4. Cornell Univ. Southwestern Seminar Field Notes. 1951–1953.
5. Edmondson, M. S. 1957. Los Manitos: A Study of Institutional Change. Middle American Research Institute, Tulane University. New Orleans, La.
6. Francis, E. K. 1956. Multiple intergroup relations in the upper Rio Grande region. Am. Sociol. Rev. **21**: 84–87.
7. Gourley, G. 1960. Reinforcement of family ties. Public Health Rpts. (U.S.). Washington, D.C. **75**(1): 65–68.
8. Hacker, D. B., M. S. Franks, V. Feske, R. J. Grass, M. Hotopp & E. M. Lantz. 1954. A Study of Food Habits in New Mexico. Bull. 384. Agric. Exptl. Sta., N. Mex. Coll. Agric. and Mech. Arts. State College, N. Mex.
9. Lantz, E. M. & P. Woods. 1958. Nutrition of New Mexican Spanish-American and "Anglo" adolescents. J. Am. Dietetic Assoc. **34**(2): 138–153.
10. Leonard, O. & C. P. Loomis. 1941. Culture of a Contemporary Rural Community—El Cerrito, N. Mex. U.S. Dept. Agric., Bureau of Agricultural Economics. Government Printing Office. Washington, D.C.
11. Mead, M. 1953. Cultural Patterns and Technical Change. UNESCO. Paris, France.
12. Samora, J. 1959. The conception of health among Spanish-Americans: a working paper. Rural Health Survey report. Santa Fé, N. Mex.
13. Saunders, L. 1944. A Guide to Materials Bearing on Cultural Relations in New Mexico. Univ. N. Mex. Press. Albuquerque, N. Mex.
14. Saunders, L. 1954. Cultural Difference and Medical Care. Russell Sage Foundation. New York, N.Y.

14*a*. *Ibid*. 51.

15. Saunders, L. 1958. Healing ways in the Spanish southwest. *In* Patients, Physicians, Illness. : 189–206, 567–569. E. G. Jaco, Ed. Free Press. Glencoe, Ill.
16. Tewa Basin Study. c. 1935. The Spanish-American Villages. Vol. II. (Albuquerque, N. Mex.)
17. Ulibarri, H. 1958. The Effect of Cultural Difference in the Education of Spanish Americans. Coll. Education, Univ. N. Mex. Albuquerque, N. Mex.
18. Van der Eerden, M. L. 1948. Maternity Care in a Spanish-American Community of New Mexico. Catholic Univ. Am., Anthropological Series, No. 13. Washington, D.C.
19. Winnie, W. W. 1957. The Spanish-speaking population of New Mexico.
20. de Galvez, B.. 1951. Instructions for Governing the Interior Provinces of New Spain. 1786. : 72. The Quivira Society. Berkeley, Calif.
21. Foster, G. 1951. A Cross-Cultural Anthropological Analysis of a Technical Aid Program. : 47–54. Smithsonian Institution. Washington, D.C.
22. Curtin, L. S. 1947. Healing Herbs of the Upper Rio Grande. Laboratory of Anthropology. Santa Fé, N. Mex.
23. Weaver, T. 1960. A comparative study in witchcraft: Pueblo Indian and Spanish American. Univ. N. Mex. Albuquerque, N. Mex. (Unpublished M. A. thesis.)
24. Borhegyi, S. F. 1953. The miraculous shrines of Our Lord of Esquipulas in Guatemala and Chimayo, New Mexico. El Palacio. **60**(3): 83–111.
25. Borhegyi, S. F. 1954. The Cult of Our Lord of Esquipulas in Middle America and New Mexico. El Palacio. **61**(12): 387–401.
26. Saunders, L. & J. Samora. 1955. A medical care program in a Colorado county. *In* Health, Culture, and Community: Case Studies of Public Reactions to Health Programs. : 395. B. D. Paul, Ed. Russell Sage Foundation. New York, N.Y.

SOCIAL CONDITIONS OF FERTILITY IN A RURAL COMMUNITY IN TRANSITION IN CENTRAL ITALY*

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This article is the summary of a preliminary report on social conditions of fertility in Cantalice, a rural community of Central Italy. The study of fertility is part of a larger research program designed to examine the dynamics of male and female roles and of family organization in a changing rural society. Cantalice, under the influence of the modern world and specifically of a nearby urban industrial area (Rieti), is now in a period of transition from a closed backward level to one more open and advanced.

General processes of change affecting the entire Italian society have in the past few decades stirred the rural world through influences from urban centers, and despite various contradictions and difficulties have brought about major transformations. These processes of change have allocated new functions to each sex, have profoundly altered the roles, status, and ideal models of the sexes, and have initiated the emancipation of woman. In addition, they have established the conditions for related changes in family structure: the extended patriarchal family is receding in importance, while the nuclear family is emerging as the most effective unit. Accompanying these changes in rural family organization is the development and diffusion of patterns and practices of reduced fertility.

Our research has been directed toward these phenomena with the objective of outlining more precisely: (1) the nature of their development and present status; (2) the various factors which determine them; and (3) their function within the social context.

Analysis of the phenomena is achieved through a dynamic methodology based on an interdisciplinary approach, combining cultural anthropology and other social sciences contributions. The contemporary situation is examined in historical perspective, assuring both the direct and the historical approach; the study of the community is considered in the framework of its relations with the outside world.

The municipality of Cantalice in Central Italy, with a resident population of 3361 inhabitants (December 31, 1958), was selected for the study in view of the following factors: (1) Cantalice represents a rural situation influenced by an urban and industrial area (Rieti), and generally it is in an intermediate position in a phase of rapid transition in the historical process of modernization; (2) the town has the character assumed within this framework by some of the phenomena that were to be the object of research, particularly by the birth rate. (The birth rate has been cut by one half in the last two decades, dropping from the traditionally high indices of Abruzzi and Southern Italy to 15.90 per 1000 in the period from 1949 to 1954, lower than the present Italian national index.)

The data has been secured by means of various techniques based on the direct approach (observation, interviewing, use of questionnaires, tests, and themes) and on documentary research. The study has been organized according to the following fundamental phases:

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* This paper represents a condensation of an extensive survey that the author has conducted in his study on social conditions in Cantalice, Italy.

(1) The general program was defined; also the basis for community selection.

(2) A research seminar was held, directed toward more precise definition of the problem, methodology, specific community selection, and the relationship of the research team to the community.

(3) This phase included the introduction of the team to Cantalice and a pilot study of the community based on observation, documentary research, 50 pilot interviews; also the preparation and pretest of individual and family questionnaires.

(4) The next step was the drawing of the random sample (ratio of 1:6 between sample and universe). The sample consisted of 140 households equal to 150 family units; of these, 7 households/family units refused to be interviewed. The remaining 143 family units that agreed to the interview represent 428 individuals beyond 14 years of age; among these were 7 refusals and 13 absentees; there were 138 individuals under 14 years of age, giving a total of 566 individuals. Questionnaires were then administered by interviews with the respondents in the sample.

(5) The instruments to be used for a study of children over six years old were developed, with special reference to the school population (including open-ended questionnaires, sentence completion, and drawing tests).

(6) A comprehensive study of 256 children was carried out.

(7) All data collected were analyzed.

(8) Additional interviews and special studies were conducted in order to integrate and deepen the general data.

Economic and Sociocultural Bases of Attitudes Toward Ideal Family Size and Fertility

The falling birthrate in relation to "modernization." The starting point for the analysis of social conditions of fertility in the municipality of Cantalice is the fact that since 1930, when the urban industrial influence of Rieti, specifically, and the influence of the modern world in general have made themselves felt, the birth rate has dropped by one half. Such processes have also occurred in other rural areas of Italy under urban and industrial influences, and obviously cannot be ascribed to a diminution of fecundity understood as the biological capacity to generate.

The research data also confirm the massive introduction of birth control practices that took place in the framework of important changes in the socioeconomic structure as well as in the culture. It is not clear if the first phase of this reductionist process was brought about through a widespread use of abortive practices. In the present situation one thing, however, is certain: the overwhelming influence of preventive and antinatal practices on the lowered birth rate. Although among these methods the condom and intravaginal douche are known to a certain extent, the method almost exclusively resorted to seems to be coitus interruptus, because of its simplicity, autonomy of achievement, and lack of cost.

The impressive drop in natality by means of birth control methods seems to be related to the development of attitudes connected with the dissolution of the patriarchal family and the emergence of the nuclear family. These changes have occurred within the framework of: (1) the transition of the Cantalician community from a subsistence economy to a market economy; (2) the development of new social and occupational roles; and (3) the impact of cultural influences from the modern urban world.

In the course of these historical processes, the objective conditions, status basis, and culture patterns associated with high fertility are upset. A new scale of values is established in which birth control is associated with positive aspirations for improvement of living standards and for modernization, so that motivations are developed for the widespread use of birth control measures.

Most probably in the first phase of birth-control development the reductionist influence was spread by individuals directly connected with urban life (such as those who worked in the new factories in Rieti). In so far as present conditions are concerned, however, our investigation has brought to light the substantial homogeneity of views of the Cantalician population in relation to patterns of family size, which tend to crystallize around an ideal two-child family. Even the older generation, who formerly accepted the traditional patterns of high fertility, now generally approve the new pattern of smaller family size. Polemics on this matter are diminishing due to lack of opposition, and tend more and more to refer to a past that lives only in memory.

The psychocultural justification for the reductionist process is clearly apparent from the research data. The fundamental argument is based on the possibility of using assets and satisfying needs connected with accepted, inalienable modern cultural patterns, and the sociological and economic bases to which they are linked. The ethical conscience of a *new* responsibility for providing children with higher levels of education, clothing, and food necessarily implies a closer correspondence between the number of children and the family's financial resources.

The research data also allow us to determine to a certain extent the character of the relationships between marital partners in Cantalice with regard to birth control. The following elements stand out:

(1) There is substantial agreement between marital partners as regards the ideal number of children; the mode of differences between the spouses is zero, the mode for both husbands and wives being two, and the average for women only slightly higher than that for males (the average for husbands being 2.26; for wives, 2.44).

(2) There is a tendency to attribute one's own ideal number of children to one's spouse. Due to the substantial homogeneity of ideals, however, this does not create errors of reciprocal judgment (the mode of differences between ideals attributed by husbands to their wives and ideals actually declared by the wives is zero; conversely, the mode of difference between ideals attributed by wives to their husbands and those actually declared by the husbands is also zero).

(3) Thus, although there may be limited communication between the couple on this response, they have arrived independently at the same formulation of ideal family size, evidently in the course of enculturation and general integration into the society.

(4) While there is the acceptance by each of the spouses of the patterns of low fertility, there is a prevailing reliance on male initiative in birth control.

(5) There is considerable female frustration in relation to sexual intercourse, a frustration that manifests itself in disinterestedness or even aversion toward intercourse and, in so far as can be ascertained, in a number of psychosomatic symptoms.

Regarding the period of the matrimonial cycle during which birth-control practices are put into effect by Cantalician families: it seems that such practices start when effective realization of the ideal number of children has been achieved by the couple. Before this time it does not appear that methodical control is exercised in order to postpone or space the birth of the number of desired children. In fact, the number of children conceived before marriage is outstanding, and it is on the increase (the average for marriages occurring since 1946 is 25 per cent).

It should finally be emphasized that the patterns of low fertility that have penetrated the Cantalician community through the influence of the outside world have spread so widely and in such a very deep and homogeneous manner precisely because of their coherence with the local transformations in socioeconomic structure. These patterns are forerunners of other aspects of the process of sociocultural modernization; the low fertility patterns are therefore not only a consequence but also an impulse toward the development and satisfaction of new needs in the direction of general progress.

FERTILITY DIFFERENTIALS BY FAMILY TYPE IN TRINIDAD*

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One of the features of the populations of Negro descent in the West Indies is their variety of mating patterns. Formal marriages account for only a small proportion of family unions, and shifts from one type of union to another are of frequent occurrence. It is possible to establish quite elaborate family typologies, but for small sample field surveys of a statistical nature this approach may be unrewarding. In the first place identification in the field of types on the basis of several characteristics is not always easy. Second, complex typologies often result in such small numbers being in each type that statistical analysis becomes difficult.

A study undertaken in Trinidad in 1958 adopted with some modifications the simple threefold typology already used in previous West Indian censuses. Here the types describe the female and not the male or the entire family unit. Sexual association is implicit in each of the three types; in other words, for a woman to be placed in any union type she must be at risk of childbearing. Basically she is assigned to a given type according to the presence or absence of two simple characteristics: the sharing of a common household by the two partners and the legal sanction of the union. Consideration of complex situations, such as a woman's association with more than one partner at a time, was not part of the survey. Such situations do occur, but it is doubtful whether their incidence is high enough to warrant specific treatment.

The first type, formal marriage, signifies that the woman is living in the same household as the man to whom she is formally married. It is the only type endowed with legal sanction.† The second type, common law, which has no legal basis, indicates that the woman shares a common household with a man to whom she is not formally married (she may in fact be formally married to someone else). The third type, visiting, again has no legal sanction and describes a woman who is in sexual association with a partner to whom she is not formally married and with whom she does not share a common household (the woman may be formally married to someone else). Since in effect we are using two classifying variables there should be four types. However, the fourth type, which would include the woman sexually associated with her legally mar-

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† Legal sanction is not always a prerequisite of a married union among East Indian elements of the population of Trinidad; in the survey women of this race are deemed to be married as long as their union is established in accordance with social custom. The experience of East Indian women, it should be noted, is not treated in this paper.

ried partner but not sharing a common household with him, is rare; in fact it has not been encountered in this survey.

Since childbearing is so intimately associated with mating habits, the existence of these various types of unions must be given due weight in any analysis of fertility in West Indian populations. In so doing one is inevitably drawn into considerations of the relative fertility of these types. It is the aim of this paper to see how much light the survey material throws on such fertility differentials.

In the survey the type of union in which the woman commenced sexual relations (the initial type) is considered, as well as the other types to which she shifts as she moves through the childbearing period. The sample was a stratified one, designed to ensure accurate representation of the two racial elements, East Indian and non-East Indian. This analysis deals with fertility among non-East Indians only, and the data refer exclusively to women of completed fertility, that is, to those aged 45 and over.

If each woman, on entering a given family type, remained in that type throughout her reproductive life, the study of these differentials would be comparatively simple. However, only a small proportion of women remain throughout their reproductive life in one type of family union. The majority of women moves from one type to another in the course of reproductive life. This is not to say that a wholly unordered pattern of mating prevails, but that the change of type that does occur definitely tends to obscure the underlying relationship between type of union and level of fertility.

Initial and Terminal Type of Union

One approach to the study of the differential is to consider the fertility of women in terms of the type of union in which they are initially involved, that is, to compare the fertility of three sets of women: (1) those whose first union is of a visiting type; (2) those whose first union is of a married type; and (3) those whose first union is of a common-law type. On these terms the average number of children born per women of completed fertility is highest among those who initially are in common-law unions (4.07) and lowest among those who are initially in visiting unions (3.22); women whose initial association is formal marriage show a total fertility rate midway between these two (3.64). All three of these groups include women who, because of the death of their partners or because of separation of one form or another, are not at risk of childbearing at the end of the reproductive period. When the experience of such sections of reduced fertility is disregarded, the total fertility rates are increased somewhat, but the rank order is maintained. On this basis the average number of children born to women initially in common-law unions is 4.26; the corresponding figure for married women is 3.70, while that for the initially visiting women is 3.42.

The age-specific fertility rates for these three groups of women, presented in TABLE 1, reveal some interesting differences. There is some suggestion that below age 20 fertility rates are highest among women initially in visiting unions. The important point, however, is that above age 20 the fertility rates for those initially in common-law unions far surpass the rates for the visiting type and are also slightly in excess of those for women initially married. Of importance is the fact that the maximum fertility rate for women initially in visiting unions (158 per 1000) occurs in the age group 20 to 24, while the corresponding values for women initially in common-law and in married types—199 and 194 respectively—are found in the age group 25 to 29.

Another approach to the problem is to consider the differentials in terms of the type of union in which the woman completed her childbearing experience, that is, her type at age 45. On these terms women who at age 45 are single must be excluded from the argument. The fertility of women grouped on this basis differs materially from that of women grouped in terms of their initial type. Total fertility is highest (3.95) for women who end their reproductive life as married; second, come those who end their reproductive life as the common-law type (3.20); those whose terminal union is of the visiting type show the lowest rate (3.08).

TABLE 1
AGE-SPECIFIC FERTILITY RATES FOR WOMEN WHOSE INITIAL UNIONS ARE THE VISITING, COMMON-LAW, AND MARRIED TYPES

Age group	Initial visiting union	Initial common-law union	Initial married union
14–	0.043	0.020	0.015
15–	0.102	0.101	0.045
20–	0.158	0.192	0.159
25–	0.132	0.199	0.194
30–	0.113	0.160	0.157
35–	0.085	0.108	0.116
40+	0.044	0.051	0.055
Total fertility	3.217	4.074	3.642

TABLE 2
AGE-SPECIFIC FERTILITY RATES FOR WOMEN WHO AT AGE 45 WERE IN VISITING, COMMON-LAW, AND MARRIED UNIONS

Age group	In visiting union at age 45	In common-law union at age 45	In married union at age 45
14–	0.005	0.008	0.005
15–	0.058	0.100	0.075
20–	0.192	0.156	0.173
25–	0.129	0.154	0.185
30–	0.101	0.108	0.164
35–	0.081	0.078	0.123
40+	0.048	0.035	0.066
Total fertility	3.076	3.204	3.954

Age-specific fertility rates for women considered according to terminal type of union emphasize an important feature of those passing through visiting associations. These show a marked concentration of childbearing in the age group 20 to 24; the rate here (192 per 1000) exceeds the maxima for the other two groups (TABLE 2). The fertility curve of women terminating their reproductive life in marriage remains high between ages 20 and 35, where it ranges from 185 to 164 per 1000. For those in common-law unions the level within this age span is not only lower but falls off more rapidly, the range being from 156 to 108 per 1000. By contrast the fertility rate for women of the visiting type dips sharply from 192 at age 20 to 24 to 101 at age 30 to 34.

Thus according to initial union type as well as terminal union type women in visiting associations show the lowest fertility. In terms of initial union, those in the common-law type show a level definitely higher than those in the married type, whereas in terms of terminal type this order is reversed. This reversal may be associated with the movement of certain sections of women from one union type to another in the course of their reproductive life.

Table 3

Probabilities of Becoming a Mother, and Survivors or Nonmothers at Various Ages out of a Cohort of 1000 Women for Initial Unions of Visiting, Common-law, and Married Types

Age interval	Probabilities of becoming a mother when initial union is			Survivors (nonmothers) when initial union is		
	Visiting	Common-law	Married	Visiting	Common-law	Married
14–15	0.042	0.025	0.015	1000	1000	1000
15–20	0.366	0.332	0.162	956	975	985
20–25	0.427	0.377	0.373	607	652	826
25–30	0.293	0.141	0.383	348	406	517
30–35	0.143	0.200	0.226	246	348	318
35–40	0.071	0.074	0.141	211	279	246
40–45	0.017	0.016	0.059	196	258	211
Over 45				192	254	199

Motherhood

The ages at which women in the three initial types of union commence childbearing appears to be of importance in assessing the fertility differentials. From the ages at which women in the three types have their first child we may calculate probabilities of motherhood within successive age intervals for cohorts coming under observation at age 14.* Age-specific chances of bearing a first child are given in TABLE 3. The chance of becoming a mother within the first year of observation, that is, 14 to 15, is greatest among women initially in visiting-type unions (42 per 1000) and lowest among those in married unions (15 per 1000). Within the interval 15 to 20 the visiting type once more shows the highest value (366), while that for the common-law type is 332; the rate for the married type (162) is less than one half of that for the visiting. Both the visiting and common-law types show maximum chances of motherhood in the interval 20 to 25: 427 and 377, respectively. In this interval the chance of motherhood for married women (373) is nearly the same as that for the common-law women. Within the interval 25 to 30 the chance of motherhood among married women rises to a maximum, whereas both the common-law and the visiting types show declines. Of special interest is the relatively high chance of motherhood at ages over 30 for married women.

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* Throughout this paper the age intervals treated are 14 to 15 and 15 to 20, continuing in quinquennial intervals to 40 to 45.

From the foregoing probabilities the proportion of women who become mothers at various ages can be estimated. In the case of those initially in visiting unions, nearly 40 per cent have by age 20 become mothers, which is much greater than the corresponding values for the common-law type (35 per cent) and the married (17 per cent) (TABLE 3). By age 30 three quarters of the visiting type have attained motherhood, and the difference between this and the value for married women narrows appreciably, as at this age 68 per cent of the latter have had their first child. As a consequence of the high rates of motherhood among visiting types at ages under 30 and of the relatively high rates among married women at ages over 30, there is little difference in the proportions of these two cohorts remaining nonmothers at age 45; both show 20 per cent childless at this age. The proportion is higher for the common-law type (25 per cent).

From the relatively high chances of motherhood at advanced ages for married women, a high average age at the birth of the first child is to be expected. In fact it amounts to 24.4 years, which is appreciably higher than corresponding values for women initially in common-law unions (21.7 years) and those initially in visiting unions (21.3 years). Thus women whose initial unions are of the stable married form become mothers at an average age of about 3 years above that for those whose initial unions are of the less stable common-law or visiting types.

It must be emphasized that the rates of attaining motherhood cannot be treated as separate and distinct from the rates of formation of the three types of initial unions. The age at which a woman bears her first child must to some degree be dependent upon the age at which she enters into association with a man. If rates of entry into the three types of initial unions differ, these should contribute to the differing ages at motherhood. In fact the average age at which women establish initial married unions (23.3 years) is 3.2 years above the corresponding figure for those establishing initial visiting unions, and 1.8 years in excess of those establishing initial common-law unions.*

Consideration of the age at formation of initial union raises a problem relevant to the study of the fertility differentials, namely, the time interval between the age at entry into a particular type of initial union and the age at birth of the first liveborn child. From information collected at the survey, the intervals for the three initial types can be compared. What is notable in this context is that the average interval between the formation of the initial union and the birth of the first child is not lowest in the case of the unstable visiting type: for such women the average interval stands at 1.9 years. The lowest interval (1.7 years) is shown by women of initial common-law unions. Those beginning their reproductive lives in the stable married unions show by far the longest average intervals (2.4 years).

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* Mating patterns of Trinidad women will be discussed in a forthcoming paper based on the survey material.

Second-order Births

All women who have borne their first live child (these may be conveniently termed mothers) are at risk of bearing a second child, and it is of interest to consider the chances of mothers initially in the three types bearing second children. The chances of so doing appear in TABLE 4. The values are highest among common-law mothers and lowest among visiting-type mothers. Within the age range 20 to 35 common-law mothers show chances of bearing a second child in excess of 43 per cent, the maximum (occurring in the interval 20 to 25) being 46 per cent. By comparison married mothers show comparable chances of 33 per cent in the interval 20 to 25, a maximum of 41 per cent in the interval 25 to 30, and a value of 27 per cent in the interval 30 to 35. Mothers in visiting unions are most prone to bear a second child in the interval 20 to 25, when the probability of so doing amounts to 35 per cent. Within the succeeding quinquennial interval the value falls to 26 per cent, and within the interval 30 to 35 it declines to 19 per cent.

Table 4

Probabilities of Mothers Bearing Second Child, and Survivors, or Mothers Who Fail to Bear a Second Child, to Various Ages out of a Cohort of 1000 Mothers for Initial Unions of Visiting, Common-law, and Married Types

Age interval	Probabilities of bearing a second child when initial union is			Survivors (mothers who fail to bear a second child) when initial union is		
	Visiting	Common-law	Married	Visiting	Common-law	Married
14–15	0.002	—	—	1000	1000	1000
15–20	0.143	0.203	0.062	998	1000	1000
20–25	0.354	0.455	0.331	855	797	938
25–30	0.255	0.430	0.411	553	434	627
30–35	0.190	0.444	0.269	412	247	370
35–40	0.093	0.160	0.241	333	137	270
40–45	0.068	0.095	0.106	302	115	205
Over 45				285	104	183

Of a cohort of common-law mothers bearing second children in accordance with the foregoing chances, 57 per cent have by age 25 already borne a second child, while by age 45 89 per cent have had their second child (TABLE 4). In the case of married mothers, only 37 per cent have by age 25 borne a second child, while the proportion bearing a second child by age 45 (81 per cent) is appreciably less than the corresponding value for common-law mothers (89 per cent). The experience of a cohort of visiting-type mothers emphasizes their relatively low fertility. By age 25 only 45 per cent have had a second child, while at the end of the childbearing period only 72 per cent have added a second child to their first.

It is once more evident that childbearing performance among visiting types is largely confined to the early ages, while married mothers tend to show relatively high performances at ages over 30. The average age at which the three types of women bear second children summarizes the position. It is lowest for those showing the highest fertility, the common-law type (24.3 years), and highest for the married type (26.7); in the case of visiting mothers it stands at 24.8 years.

Of interest also are the intervals elapsing between the births of the first and second children and the intervals between the births of the second and third children for these three types. These values also can be derived from the survey material. Average intervals between first and second births emphasize that an appreciable time elapses between these two events in the case of women in initial visiting unions (3.6 years). The corresponding values for women in initial common-law and married unions are lower—2.6 and 2.5 years, respectively. The same pattern is noted for the intervals between the births of the second and third children. Women in initial visiting unions show the longest interval (2.9 years), while those in initial common-law or married unions show an average interval of 2.4 years. Thus in spite of the relatively early age at which women in initial visiting unions begin childbearing, their low fertility pattern soon emerges in the form of extended spacings between births.

TABLE 5

AVERAGE AGE IN YEARS AT BIRTH OF LAST CHILD, BY AGE AT BIRTH OF FIRST CHILD FOR WOMEN OF INITIAL UNIONS AS VISITING, COMMON-LAW, AND MARRIED

Age group at birth of first child	Average age at birth of last child when initial union is		
	Visiting	Common-law	Married
14—	22.1	29.7	27.4
15—	27.6	29.7	30.4
20—	31.9	34.2	33.1
25—	34.2	35.6	35.5
30—	37.1	37.4	37.3
35—	40.0	38.4	41.1
40—	47.5	42.3	—
All ages	30.3	32.6	33.9

Birth of Last Child

The woman's age at the time of the birth of her last liveborn child may be just as important in assessing total fertility as her age at the birth of her first child. Tabulation of mothers by age at birth of first child as well as by age at birth of last child provides simple means of treating certain aspects of the termination of childbearing.

TABLE 5 shows the average age at birth of the last child for women attaining motherhood at various ages. Those initially in visiting-type unions have consistently the lowest ages at birth of last child. On the other hand those in common-law types tend to be relatively high. Because of the large number of women attaining motherhood within the interval 15 to 25 in the case of the visiting and common-law types, these average ages are of special importance. For the visiting type the averages for those becoming mothers at ages 15 to 19 and 20 to 24 (27.5 and 31.9 years, respectively) are about 2.2 years below the comparable values for the common-law. The differences between the common-law and the married within this interval is, however, much smaller. Mothers initially in married unions tend to bear their first child at a comparatively high age, so that large numbers become mothers within the ages 25 to 29. About one quarter of the married mothers have their first child within the interval 25 to 29, as compared with 13 per cent for the visiting-type mothers and 8 per cent for those in common-law unions. It is this fact that largely determines the high average age of birth of last child for married women: 33.9 years. This is 3.6 years in excess of the value for the visiting type and 1.3 years above that for common-law women.

Each age cohort of mothers has its own age-specific schedule of probabilities of bearing the last child. By weighting according to the numbers attaining motherhood in each cohort, we can derive crude comparative probabilities of bearing the last child for each of the three types. These appear in TABLE 6. Clearly, visiting-type mothers cease childbearing at a much more rapid rate than the common-law or married types within the important age span under 30. Within the first year's experience (14 to 15) the chance of a visiting-type mother ceasing to bear children stands at 2 per cent, as compared with zero for the common-law and married types. For the interval 15 to 20 the chance of bearing the last child for visiting-type mothers (15 per cent) is appreciably higher than the corresponding values for common-law (10 per cent) and married (4 per cent). As expected, at ages over 30 there is not much difference between the values for the three types.

TABLE 6
PROBABILITIES OF BEARING LAST CHILD FOR MOTHERS WHOSE INITIAL UNIONS ARE VISITING, COMMON-LAW, AND MARRIED TYPES

Age interval	Initial union of visiting type	Initial union of common-law type	Initial union of married type
14–15	0.015	—	—
15–20	0.153	0.101	0.037
20–25	0.221	0.130	0.100
25–30	0.238	0.996	0.205
30–35	0.267	0.296	0.308
35–40	0.478	0.448	0.463
40–45	0.830	0.940	0.878

Length of the "Childbearing Span"

The ages at which women commence childbearing and the ages at which they bear their last child have emphasized the low age at which women in visiting unions have their first child and the advanced age at which this occurs for married women. Also of interest are the marked differences in ages at which the last child is born. It is therefore necessary to see how the available data can be utilized to show, even in crude form, the length of the "childbearing span," or the time between the mother's age at birth of the first and age at birth of the last child.

The length of time spent by a woman "in childbearing" can be estimated from the survey material. In fact, the difference between the woman's age at the birth of her first liveborn child and her age at the birth of her last liveborn child is taken as a measure of the time during which she was involved in childbearing (on these terms, it must be noted, a woman with only one child passes zero years in childbearing. Mothers initially in the visiting type who, it will be recalled, show an average age of motherhood of 21.3 years and an average age at birth of last child of 30.2 years, spend the least number of years in "childbearing"—8.9. Those initially in common-law unions, who show an average age at motherhood of 21.7 years and an average age at birth of last child of 32.6 years, enjoy the longest period in childbearing—10.9 years. Those initially married, with an average age at motherhood of 24.4 years and an average age at birth of last child of 33.9 years, show a period "in childbearing" of 9.5 years. This advantage in length of childbearing shown by the common-law type over the married and the visiting—1.4 years and 2.0 years, respectively—probably contributes appreciably to the differences in fertility already noted.

Fertility by Patterns of Union Change

So far discussion has centered on differentials in terms of type of union in which the woman was involved initially or at the time when she ended her reproductive life. However, since many women participate in more than one type, the analysis must be extended to consider classes or groups based on participation in more than one type, or types prevailing at different points along the childbearing span. A relatively simple approach of this kind is to establish patterns of union change on the basis of the type of union in which a woman is initially engaged and the type in which she passed her 45th year. This system of grouping ignores types in which a woman may be involved at some stage between the initial and the terminal.

On the foregoing basis, 15 patterns of union change can be usefully distinguished. Three cover women who begin family associations in a given type and remain in that type up to age 45. Continuation of a given type does not, of course, preclude changes in partners. Three other patterns cover women who, although at age 45 are in the same type of union as their initial one, nevertheless have been in some other type or types in the intervening years. Three other patterns arise as a consequence of the termination of a union before age 45, either through death of the partner or separation of one form or another; here a woman initially in a married, common-law, or visiting type is at age 45 single, that is, without a partner. Finally six patterns arise because of participation in a given initial type and participation in one of the other two at age 45; for example, women initially married contribute two patterns: one having as the terminal type visiting and the other having as the terminal type common-law. A residual pattern describes women who are genuinely single, that is, who have never been in any form of family association up to age 45: these have never been at risk of childbearing. The patterns of union change are set out in Appendix I, and it is convenient to refer to them by the numbers affixed to each.

These patterns vary markedly in size, and their relative importance can be satisfactorily assessed by the proportion each contributes to the total number of live born children (4342) to women in the sample. Two patterns dominate the picture: the first (Pattern 10), which consists of women who marry initially and remain married up to age 45, contributes 22.8 per cent of total births. The second (Pattern 1) consists of those initially in visiting unions and who at age 45 are married; these contribute 22.6 per cent of total births. Two others are also important: Pattern 8, women initially in common-law unions who eventually marry (these account for 11.6 per cent of total births), and Pattern 2, those initially in visiting unions who eventually contract common-law relationships (these contribute 11.5 per cent of total births). Together these four account for 68.5 per cent of all births to women in the sample and dominate their fertility situation.

Using these 15 patterns we can more carefully assess the relative fertility of each of the three broad union types, that is, initially common-law, initially visiting, and initially married. Each of these three is composed of 5 component patterns. Those initially visiting are composed of Patterns 1, 2, 3, 12, and 13; those initially common-law are composed of Patterns 7, 8, 9, 11, and 15; those initially married are composed of Patterns 4, 5, 6, 10, and 14.

There are in each of the three broad types two component patterns describing women who are in the same type of union both at the commencement and at the termination of childbearing. They cannot be treated as "pure" types since Patterns 13, 14, and 15 experience shifts to other types in intervening years. It is nevertheless instructive to see what part these three pairs play in determining the fertility levels of the three broad types. Patterns 12 and 13 give a total fertility for women in visiting unions of 2.71. Patterns 11 and 15 give a total fertility of 3.54 for common-law unions. Patterns 10 and 14 show for married unions a total fertility of 3.87. Thus on this basis, fertility among the married type exceeds that for the common-law. However, these pairs of component patterns vary markedly in their contributions to the total births of each of the three broad types. Thus Patterns 12 and 13 account for only 10 per cent of all births to women initially in visiting-type unions and accordingly do not play a large part in determining the general fertility of this broad type. Patterns 11 and 15 account for 46 per cent of all births to women initially in common-law type unions, thus contributing on a more significant scale to over-all fertility of this type. By contrast Patterns 10 and 14 account for the vast majority (88 per cent) of all births to women initially married, and consequently those patterns largely determine the fertility of this broad type.

The net result of introducing the other component patterns into the argument is to modify somewhat the fertility exemplified by these pairs of components. The latter rate for the common-law is appreciably augmented. This is due largely to the very high fertility of Pattern 8 (total fertility 4.95) and the very high proportion (60 per cent) it forms of births to women initially in common-law unions. Similarly Patterns 1 and 2 markedly augment the fertility of women initially in visiting unions. These show total fertilities of 3.66 and 3.26, respectively, and together account for 80 per cent of all births to women initially in this type. On the other hand the effects of Patterns 4 and 5 on the fertility of the married type as exemplified by Patterns 10 and 14 is to reduce it but slightly; together these account for only 7 per cent of all births to women initially married.

Let us now consider the contribution of the component patterns to the three types identified on the basis of terminal states. Patterns 4, 7, 12, and 13 comprise the broad type terminating as visiting. Patterns 2, 5, 11, and 15 constitute the types terminating in common-law unions. Patterns 1, 8, 10, and 14 constitute those terminating in marriage at age 45. Patterns 4 and 7 considerably force upward the fertility of women who at age 45 are in visiting unions. Both of these show total fertilities in excess of Patterns 12 and 13 (5.57 and 3.36, respectively), and together they account for 36 per cent of total births to this type. The introduction of Pattern 8, with a total fertility of 4.95 and responsible for one fifth of births to women married at age 45, is mainly responsible for the high rate of this type. On the other hand the introduction of Patterns 2 and 5 into the common-law type tends to pull down the general fertility of the latter. Pattern 2 has a total fertility of 3.26 and Pattern 5 one of only 2.41, and together they account for 67 per cent of total births to women who at age 45 are in common-law unions.

The rank-order relationship of the fertility of these 15 patterns is of interest (the rates for each are given in Appendix II). Patterns with terminal stages as single (3, 5, and 9) as well as the very small one (Pattern 4) are excluded from this consideration. The range is appreciable, the highest rate (that of Pattern 8) being much more than twice that of the lowest (shown by Pattern 12). Pattern 8, with a total fertility of 4.95, is by far the most fertile. It is at a level 23 per cent above that of the second highest, Pattern 11, which shows a total fertility of 4.01. It is important to note that in each of these the common-law type is involved. The third and fourth highest positions (with total fertilities of 3.88 and 3.72, respectively) are taken by patterns involving marriage (10 and 14). By contrast the fifth rank is taken by Pattern 1, with a total fertility of 3.66, while next comes Pattern 12 with a total fertility of 3.45. The two last mentioned, it should be noted, are largely composed of women who pass some time in visiting unions. Again therefore there is evidence that common-law yields the highest fertility and visiting unions the lowest.

It is of interest to note some data for Pattern 8. Although its age at motherhood (21.6 years) is slightly lower than that for all women initially in common-law unions, it is still somewhat higher than that for visiting-type females (21.3 years). The average age of women at the birth of the last child is comparatively high (33.7y ears). In terms of the approach already adopted the average number of years spent between the birth of the first and the last child is 12.1 years, which also is comparatively high.

Fertility of the "Pure" Union Types

On the assumption that the experience of females who pass their entire reproductive life in a given union type conveys a picture of the "pure" fertility of that type, we may consider more closely the fertility of Patterns 12, 11, and 10, since from these we may gather information about the pure fertility of the types under study. The fact that Patterns 12 and 11 are very small in number, amounting to only 31 and 53 women, respectively, as compared with 257 for Pattern 10, somewhat limits the rates that can be safely computed for them. Nevertheless a comparison of the relative positions of the pure levels these exemplify seems justified.

From the fertility rates presented in TABLE 7, the common-law type shows the highest levels with a total fertility of 4.02, which is 3 per cent above that for the married (3.89) and about twice as high as that of the visiting type (2.06). Fertility of the visiting type remains very low at ages over 20, being in most age groups less than one half the corresponding levels for the other two types. Between ages 15 and 29 the common-law type shows the highest rates, the maximum of 0.238 occurring in the group 25 to 29. The relatively high levels for married women at ages over 30, with which we are now familiar, are once more in evidence; within this span, rates for this type are appreciably in excess of those for the other two types.

The concentration of childbearing in the lower age groups by visiting unions and at higher ages by married unions is again shown in the proportions of births to women at various ages. By the age of 25 years married women have had only 23 per cent of their total births, which is markedly lower than the corresponding proportions for common-law women (33 per cent) and visiting-type women (44 per cent). By contrast one half of the births to married women take place at ages over 30, which is much higher than the comparable proportions for common-law women (37 per cent) and visiting (34 per cent).

TABLE 7

AGE-SPECIFIC FERTILITY RATES FOR PATTERNS 12, 11, AND 10

Age group	Pattern 10	Pattern 11	Pattern 12
14–	0.006	—	0.002
15–	0.045	0.064	0.026
20–	0.129	0.204	0.153
25–	0.090	0.238	0.209
30–	0.065	0.162	0.178
35–	0.045	0.098	0.141
40–	0.026	0.038	0.061
45–	0.006	—	0.007
Total fertility	2.06	4.02	3.88

With respect to the age at which women bear their first child, the pure experience of the visiting union indicates an average age at motherhood of 22.8 years, which is somewhat higher than that for common-law women (22.4 years), but much lower than that for the married (24.7).

Despite the fact that the average age at birth of last child for the pure common-law type (32.6 years) is less than that for the married (35.2), both groups show the same period in childbearing: 10.2 years. On the other hand the low fertility position of the pure visiting type is fully demonstrated by the fact that the average age at birth of last child is 29.2 years, that is, 3.4 years below the level of the common-law and 6.1 below that of the married. Equally indicative of the low fertility of the pure visiting union is its short period spent in childbearing, 8.6 years. The latter is 1.6 years below the corresponding values for the pure common-law type and the pure married type.

How do the pure fertility levels differ from the broad ones already established on the basis of the woman's initial type of union? There is not much difference in the case of the common-law and married types. The pure levels for the former are slightly lower than those estimated on the basis of initial types, while the pure married rates are somewhat in excess of those established from initial types. In both instances the differences are small. In contrast to this the pure fertility of the visiting type is much lower than that of all women initially in visiting unions. Thus total fertility of the latter is 55 per cent above that of the pure visiting level. Both approaches maintain the same rank order: highest common-law, second married, and lowest visiting.

Stability of Union Type and Level of Fertility

If we can arrive at some plausible index of stability of the three basic types of union, we may examine the hypothesis that fertility is to some degree conditioned by the stability of the union type. It is generally accepted that the socially and legally sanctioned union, marriage, is the most stable, and that the visiting is the least stable. Undoubtedly the degree to which women tend to remain within the union type in which they are initially should weigh heavily in any index of stability. However, factors such as the number of partners with whom a woman has been associated while in a given union type, together with other factors of a social and economic nature that may tend to precipitate crises within families, have also to be considered. Here, however, we use as a measure of stability a simplified index that rests solely on the extent of movement from one type of union to another. This measure, based on material to be discussed in a forthcoming paper, is derived as follows.

Of a cohort of 10,000 females some enter the initial stage as, for example, visiting. Some of the latter shift to common-law or to married unions before reaching age 45, while others remain in visiting unions throughout. The proportion of initially visiting women who remain in this type up to age 45 is taken as an index of stability. If no women shift to other types before age 45 the measure is 100.0 per cent, and the lower the index the greater the instability it signifies.* By considering women initially in common-law and married types, indices of stability for these can also be derived. The results shown in TABLE 8 leave no doubt that, on the present approach, common-law types are only one half as stable as married, while visiting types show less than one half the stability of the common-law.

The fertility of women indicative of the pure types are here compared with the fertility of women who, although initially in a particular type, are at age 45 in another one. For the hypothesis to be supported, women who at the termination of the childbearing span are in a more stable type than they were initially should show a fertility somewhat higher than the pure level.

When the total fertility rates of the 15 patterns are arranged as in TABLE 9 there is some support for the hypothesis. For women initially in visiting unions the rising level with increasing stability of terminal type is clear. Women initially in visiting associations and who at age 45 are in common-law unions show a total fertility of 3.26, which is 48 per cent above that for the pure visiting type. Similarly those initially in visiting unions whose terminal type is marriage show a fertility of 3.66, which is 78 per cent above the pure level.

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* Those women who are single at age 45, that is, widowed or separated from their partners, are not included in calculating this index.

The same situation appears among women initially in common-law unions. Those whose terminal type is the unstable visiting form show a total fertility of 3.36, a figure 16 per cent lower than that indicative of the pure common-law fertility. On the other hand women who end their childbearing span in formal marriage have the highest total fertility of all the 15 groups; this level of 4.95 is 23 per cent higher than the pure common-law level.

On the basis of the foregoing, one should expect the pure fertility of the formally married women to be higher than that for women who, although initially married, are at age 45 either in visiting or common-law unions. The number of women initially married and in visiting unions at age 45 is so small (there are only 7) that their relatively high total fertility (5.57, which is substantially in excess of that for the pure married type) cannot be taken as conclusive evidence against the hypothesis. Fertility for women initially married and in common-law types at age 45, however, is only 2.41, a figure 37 per cent below the pure level, thus lending support to the hypothesis.

Table 8

Index of Stability for Types of Initial Union

Initial union type	Index of stability (%)
Visiting	14.0
Common-law	43.3
Married	88.8

Table 9

Total Fertility Rates of Women According to Type of Initial and Type of Terminal Unions

Type of terminal union	Type of initial union		
	Visiting	Common-law	Married
Visiting	2.06	3.36	5.57
Common-law	3.26	4.02	2.41
Married	3.66	4.95	3.89
Single	2.38	3.25	3.33

These figures thus tend to substantiate the hypothesis that stability of union type influences the general level of fertility. Added significance would accrue if at the same time it could be shown that the interruption of a union before 45 resulted in a level of fertility somewhat lower than that of the appropriate pure type. For example we should expect that the fertility of women initially in married unions and single at age 45 would be lower than the level appropriate to the pure married type.*

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* For this line of evidence to be wholly convincing, the women initially in a particular type of union should remain in that type up to the time of entry into the single state. Actually many women shift to other types before becoming single.

The evidence on the foregoing is as follows. Women initially in common-law unions and returned as single at age 45 show a total fertility markedly lower (19 per cent) than the corresponding pure level. Similarly women initially married and single at age 45 show a total fertility 14 per cent less than that of the pure married type. However, there is no evidence of a reduction brought about by death or separation among women initially in visiting unions; these exhibit a fertility 15 per cent above that of the pure visiting type. At best, therefore, this evidence is only suggestive.

Illegitimacy Levels

In the so-called illegitimacy rates computed from the Registrar General's returns, all births to common-law and visiting types are treated as illegitimate, while only those to married women are treated as legitimate. It is of interest to compare the levels of illegitimacy thus defined with estimates of the proportions of total births contributed by each of the three types.

TABLE 10

PROPORTION OF BIRTHS CONTRIBUTED BY EACH UNION TYPE, BASED ON YEARS SPENT IN EACH UNION TYPE AND TOTAL FERTILITIES OF PURE TYPES

Union type	Time spent by average woman in union type		Fertility of pure type		Joint index (*a*) + (*b*)	Per cent of (*a*) + (*b*) accounted for by union type*
	Years	Index (*a*)	Total fertility	Index (*b*)		
Visiting	4.13	43.2	2.06	53.0	96.2	20.9
Common-law	5.93	62.1	4.02	103.3	165.4	35.8
Married	9.55	100.0	3.88	100.0	200.0	43.3

* Taken as indicating the proportion of births to each union type.

The level of illegitimacy in the population seems dependent on two factors: (1) the number of years spent by women in the several union types as they pass through the childbearing span, and (2) the levels of fertility appropriate to each type. The pure total fertilities already presented may be taken as estimates of the latter. The present survey material also yields the average number of years spent in each family type by women of a cohort passing through the childbearing period and exposed to the prevailing chances of mating.† On the assumption that these two variables can be given equal weight, they can be used to construct simple indices as in TABLE 10. A simple combination of these indices is here taken as giving the proportions of births contributed by each of the three types. It thus appears that the married type contributes 43.3 per cent of total births, the common-law type contributes 35.8 per cent, while the visiting type is responsible for only 20.9 per cent. These are in very close accord with the proportion of illegitimate births recorded during the period from 1922 to 1944, that is, 57 per cent, but the weakness of the conventional rate is that it obscures the fact that four fifths of all births occur to women who are living with a partner, either in formal marriage or in common-law relationships.

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† These data will be presented in the forthcoming paper already mentioned.

Conclusion

These are some of the principal factors associated with each union type: The visiting type commences childbearing at a relatively early age and also ceases childbearing at an early age, with the result that the period passed in childbearing is of relatively short duration. Most of the childbearing activity for this type is concentrated in the lower age ranges. At the same time a relatively long interval separates the age at entry into the union from the age at birth of first child; the interval between the birth of the first and second child is also relatively long. Furthermore it seems that women initially in visiting unions and moving to more stable associations show higher fertility than that of women who remain throughout the childbearing period in visiting unions. It is estimated that approximately one fifth of all births are contributed by women in this type of union.

In the common-law type, childbearing begins at an age slightly higher than that shown by visiting types, but appreciably lower than the age for the married. Childbearing is less concentrated in the lower age ranges than in the case of the visiting unions. A large proportion of these women bear a second child, and the interval between the births of the first and second child is lower than that observed for the visiting type. The evidence is that fertility is relatively high for women shifting from the less stable visiting union to the common-law; on the other hand those moving from common-law to married show a much higher level than the pure common-law type. Women moving from the common-law to the less stable visiting show fertilities lower than those of the pure type. This type contributes about 36 per cent of total births.

Married women commence childbearing at a relatively high age, bear their last child at a relatively high age, and show a period in childbearing lower than that for the common-law. In marked contrast to the other two types, married women show a concentration of childbearing over age 30; in fact one half of the births to these women occur when they are over 30. The time between the birth of the first and the birth of the second child is the shortest of the three. Again there is a suggestion that women commencing childbearing in the stable married form and shifting to a less stable one show a lower fertility than those who remain married throughout. About 43 per cent of all births occur in formal marriage.

When the unions are classified on the basis of the initial stage and when the pure experience of the three are considered, the common-law appears as the highest in fertility and the visiting as the lowest. On two other approaches, however, the married appears as the highest. When the classification is on the basis of terminal type and when we consider all women who are in the same type of union at the commencement and at the termination of the childbearing period (that is including those who may have been in other types in intervening years), the married appears as the highest and the visiting as the lowest.

Both the 1943 and the 1946 censuses show marriages as having the highest fertility and the visiting unions as having the lowest. Census classification based on existing situations tends to correspond with the classification on the basis of terminal states, and thus our classification is in accord with the census findings.

The changes involved between levels of marriages and common-law unions in respect of initial and terminal classifications are, as has already been pointed out, associated with shifts from one type to another in the course of movement through the reproductive span.

It can be shown that the differing levels according to the scheme of classification arise primarily from the fertility of the patterns that have to be re-allocated on the basis of the two systems of grouping. Thus the initial married type is composed of Patterns 4 and 5, both of which will have to be re-allocated elsewhere on the basis of a terminal grouping, as well as Patterns 10 and 14, which are integral parts according to both schemes of grouping. According to the terminal grouping, the married types cover Patterns 10 and 14, as well as 1 and 8; the latter being introduced solely in the process of re-allocation. Clearly the differences between total fertility based on initial grouping and that based on terminal grouping must depend on the differences in fertility levels and in numerical size between, on the one hand Patterns 4 and 5, and on the other hand Patterns 1 and 8. A method used by G. J. Stolnitz is available for comparing the importance of these two components of difference. It appears that 76 per cent of the difference is ascribable to the higher level of Patterns 8 and 1, and only 24 per cent to their size.

By a similar approach it can be established that the lower total fertility shown by common-law types grouped on the basis of terminal stages compared with the common-law established on the basis of initial types is almost wholly due to the very high fertility shown by Patterns 7 and 8 as compared with Patterns 2 and 5. In fact 93 per cent of the total difference can be ascribed to fertility and only 7 per cent to composition changes.

Beyond all doubt the visiting unions are strongly characterized by low fertility patterns. Both the common-law and the married are on a much higher level. Much of the present analysis rests on classifications established on initial type and shows unquestionably that common-law unions have a higher fertility than married. There are strong grounds for assuming that a woman's initial association, the nature of which must to some degree be determined by her social and economic position, gives some indication of the course and level of her future fertility performance. It may be contended, on the other hand, that the union in which a woman concludes her reproductive life gives some indication of the course of her social and economic life and hence of her fertility performance. On this basis, at least, marriage appears as a type of high fertility. To a large extent therefore the question of which union type shows the higher fertility—common-law or married—depends on the method of classification one adopts.

Reference

1. Stolnitz, G. J. 1956. Population composition and fertility trends. Am. Sociol. Rev. **21**(6).

APPENDIX I

Patterns of Union Change

Pattern 1	Initial type Visiting	Terminal type Married
Pattern 2	Initial type Visiting	Terminal type Common-law
Pattern 3	Initial type Visiting	Terminal type Single
Pattern 4	Initial type Married	Terminal type Visiting
Pattern 5	Initial type Married	Terminal type Common-law
Pattern 6	Initial type Married	Terminal type Single
Pattern 7	Initial type Common-law	Terminal type Visiting
Pattern 8	Initial type Common-law	Terminal type Married
Pattern 9	Initial type Common-law	Terminal type Single
Pattern 10	Initial type Married and remaining in this type up to age 45	
Pattern 11	Initial type Common-law and remaining in this type up to age 45	
Pattern 12	Initial type Visiting and remaining in this type up to age 45	
Pattern 13	Initial type Visiting With intermediate type or types other than Visiting	Terminal type Visiting
Pattern 14	Initial type Married With intermediate type or types other than Married	Terminal type Married
Pattern 15	Initial type Common-law With intermediate type or types other than Common-law	Terminal type Common-law
Pattern 16	Never in any type of union up to age 45	

APPENDIX II

Age-specific Fertility Rates and Total Fertilities of Family Patterns

Age group	Pattern*													
	1	2	3	5	6	7	8	9	10	11	12	13	14	15
14–	0.041	0.065	0.026	0.002	0.045	—	0.029	0.023	0.008	—	0.032	0.037	—	0.032
15–	0.100	0.120	0.104	0.087	0.066	0.071	0.124	0.114	0.026	0.064	0.045	0.074	0.120	0.084
20–	0.170	0.150	0.120	0.139	0.173	0.171	0.222	0.155	0.153	0.204	0.129	0.274	0.208	0.136
25–	0.151	0.137	0.096	0.130	0.176	0.143	0.218	0.173	0.209	0.238	0.090	0.119	0.168	0.136
30–	0.133	0.114	0.090	0.057	0.140	0.157	0.216	0.095	0.178	0.162	0.065	0.074	0.136	0.065
35–	0.104	0.083	0.052	0.043	0.072	0.086	0.137	0.086	0.141	0.098	0.045	0.089	0.088	0.071
40–	0.055	0.028	0.009	0.022	0.030	0.043	0.073	0.023	0.061	0.038	0.026	0.052	0.024	0.045
45+	0.010	0.008	—	—	—	—	—	—	0.007	—	0.007	—	—	—
Total fertility	3.66	3.26	2.38	2.41	3.33	3.36	4.97	3.25	3.88	4.02	2.06	3.44	3.72	2.71

* Rates are not calculated for Pattern 4 because of its very small size.

Part III. Sociocultural Factors in Chronic Organic Disease and Research Perspectives in Medicine and Social Science

SOCIOECONOMIC ASPECTS OF THE INCIDENCE OF CANCER IN PUERTO RICO*

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The Puerto Rican community has undergone significant changes in its structure during the last 20 years. These changes have affected the public health picture with a resulting increase in the life expectancy of the population. In the year 1940 the average Puerto Rican had a life expectancy of 45 years; at the present time this age has increased to 68 years. Puerto Rico has not been an exception to the rule that improved life expectancy means increase in the cancer and cardiovascular problems. At the present time cancer constitutes the second highest cause of death.

The cancer problem in Puerto Rico presents unusual features in comparison to that of more highly developed countries such as the continental United States and Northern European communities. These differences pertain to total incidence and relative frequency of different types of neoplasms. FIGURE 1 shows the predominant types of cancer reported to the Puerto Rico State Cancer Registry in the year 1954, in order of percentage incidence for both sexes. Gastrointestinal cancer constitutes the highest percentage of cases of the disease in males, while cancer of the uterus constitutes the highest percentage of cases in females. Common forms of cancer in the United States, such as carcinoma of the breast and lung, are remarkably less frequent in Puerto Rico. However, other forms such as cancer of the cervix uteri and esophagus are very prevalent. It is interesting to note that the over-all incidence of cancer of the esophagus is slightly higher than that of cancer of the breast.

Physicians concerned with cancer patients in Puerto Rico have had the impression that certain forms of cancer affect some social groups more than others. Up to the present time there has been no opportunity to prove or disprove this impression. The present report is an attempt to investigate differences in incidence of cancer that might possibly be related to socioeconomic status.

Previous studies on the relationship of socioeconomic factors and incidence of cancer of various sites have been published in several countries. Examples of these studies are those presented by Young[10] for England and Wales in 1926, Clemmesen[1] on Copenhagen, Denmark, in 1951, Cohart[2-5] for New Haven, Conn., in 1954 and 1955, and Graham *et al.*[6] for Buffalo, N. Y., in 1960. The British Registrar General published reports in the years 1927, 1938, and 1954 containing interesting information on cancer deaths in England and Wales.[7-9]

Material and Method

Cancer-case material was obtained from the State Cancer Registry of the Puerto Rico Department of Health. This registry was started in 1950 when

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the disease was made reportable by law. Information is obtained from reports submitted by hospitals, physicians, pathology laboratories, and from death certificates. The cases reported for the years 1953 and 1954 were taken for this study to be compared chronologically with a survey of socioeconomic levels conducted by the Puerto Rico Planning Board during the year 1953.

The registry data for 1953 contain 16 per cent of cases based on death certificates only as compared with 10 per cent for the year 1954. Inasmuch as the forms used in the registry do not contain information concerning socioeconomic status of the patients, it has been necessary to use the type of hospital where the report originated as the basis for classification of the economic status of the case. In the years covered by this study there existed a sharp distinction between charity and private hospitals in Puerto Rico, with very little overlap between these two categories. Using the stated basis for the purpose of this study, the registry cases for 1953 and 1954 were divided in two major groups, which were labeled (1) indigent and (2) nonindigent.

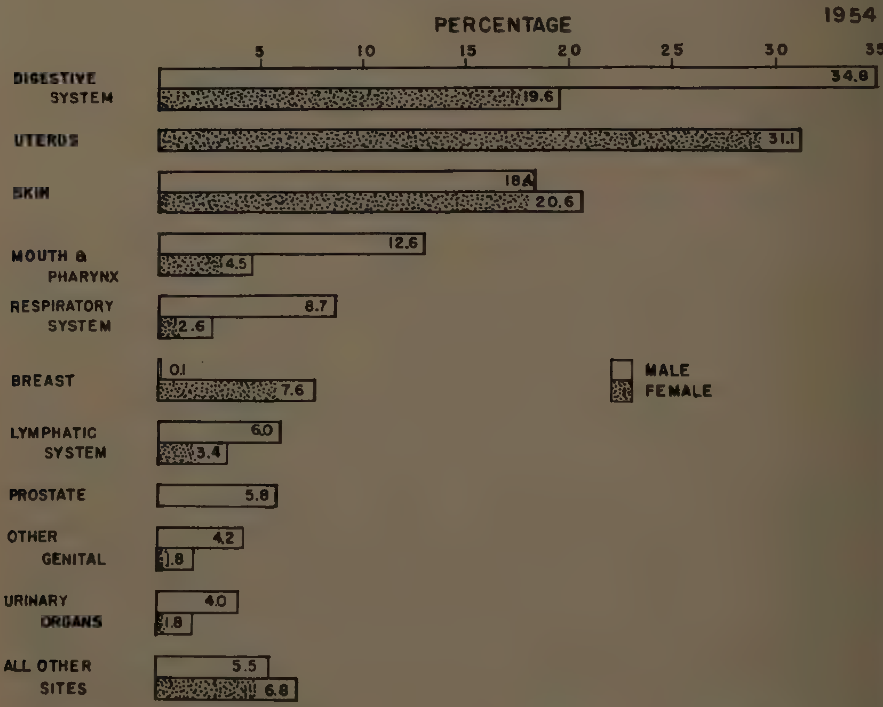

FIGURE 1. Percentage distribution of cancer cases in Puerto Rico by sex and site.

Inasmuch as census data in Puerto Rico did not contain divisions of population according to residence or socioeconomic levels, we were obliged to substitute information obtained by the Puerto Rican Planning Board in a study conducted for the period from 1953 to 1954. The purpose of that study was to determine the labor-force status of the island at that particular time. A sample of 2482 families was studied regarding family income and expenditure for the calendar year 1953. As this data was designed to be representative of the labor force, it was limited to persons 14 years of age or older, which is the legal minimum age for employment. Families with incomes less than $2000 yearly were considered indigent. The experience with this group was projected to the entire population with the result that 64 per cent of the male population and 76 per cent of the women were classified as indigent. In the determination of incidence of cancer at the different age levels for the two socioeconomic groups, it was necessary to make a projection of the population data to include persons under 14 years of age. Cancer incidence in general and for some specific sites, in both sexes and at different age levels was determined for the indigent and nonindigent population. TABLE 1 shows the results obtained when the incidence is determined for both sexes in the indigent and nonindigent groups. TABLE 2 shows the incidence distribution for various age levels. The total sample of cases used was 5183, of which 3265 were indigent (seen at charity hospitals) and 1918 were nonindigent (seen at private hospitals). Not included were 137 cases that could not be classified.

TABLE 1

AVERAGE ANNUAL INCIDENCE PER 100,000 POPULATION AND THE SOCIOECONOMIC STATUS OF CANCER IN PUERTO RICO BY SITE AND SEX: 1953 TO 1954

Specific sites	Indigent						Nonindigent					
	Male		Female		Both sexes		Male		Female		Both sexes	
	No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.
Lip	18	1.1	3	0.2	21	0.6	6	1.1	6	1.0	12	1.1
Esophagus	117	7.0	74	4.4	191	5.7	42	7.9	27	4.6	69	6.2
Stomach	247	14.8	80	4.8	327	9.8	242	45.9	143	24.5	385	34.6
Large intestine except rectum	19	1.1	21	1.3	40	1.2	36	6.8	57	9.7	93	8.4
Rectum	24	1.4	25	1.5	49	1.5	20	3.8	23	3.9	43	3.9
Trachea, bronchus, and lung	67	4.0	22	1.3	89	2.7	64	12.1	18	3.1	82	7.4
Breast	2	0.1	134	8.1	136	4.1	3	0.6	83	14.2	86	7.7
Cervix uteri	—	—	575	34.6			—	—	141	24.5		
Corpus uteri and uteri unsp.	—	—	49	2.9			—	—	82	14.0		
Prostate	57	3.4	—	—			76	14.4	—	—		
Kidney	8	0.5	12	0.7	20	0.6	9	1.7	2	0.3	11	1.0
Bladder and other urinary organs	42	2.5	20	1.2	62	1.9	45	8.5	19	3.2	64	5.8
Melanoma of skin	9	0.5	8	0.5	17	0.5	2	0.4	6	1.0	8	0.7
Malignant neoplasm of skin	282	16.9	360	21.7	642	19.1	126	23.8	139	23.8	265	23.9
Thyroid gland	2	0.1	19	1.1	21	0.6	6	1.1	13	2.2	19	1.7
Lymphosarcoma and reticulosarcoma	11	0.7	7	0.4	18	0.5	2	0.4	14	2.4	16	1.4
Total specific sites	905	54.2	1409	84.7	2314	69.5	679	128.7	773	132.4	1452	130.7
Total all sites	1504	90.0	1761	105.9	3265	98.0	926	175.6	992	169.9	1918	172.6

General Cancer Incidence

The average annual incidence of cancer in Puerto Rico for the years 1953 and 1954 was 135 per 100,000 people; for the indigent it was 98, and for the nonindigent it was 172 per 100,000 people. The observed difference occurred in each sex and at all age levels, being highest in the group older than 64 years. The median age for the population in Puerto Rico during this period, was 18.4 years for the nonindigent and 15.4 years for the indigent group.

Skin

There is no significant difference between the two groups in the incidence of melanoma of the skin. Carcinoma of the skin (expressed as "other malignant neoplasms of skin") is slightly more predominant in the nonindigent pop-

TABLE 2: CANCER INCIDENCE IN DIFFERENT AGE GROUPS AMONG

	0–4		5–9		10–14		15–19	
	No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.
CANCER INCIDENCE PER 100,000 INDIGENT POPULATION FOR								
Lip	—	—	—	—	—	—	—	—
Esophagus	—	—	—	—	—	—	—	—
Stomach	—	—	—	—	—	—	—	—
Large intestine except rectum	—	—	—	—	—	—	—	—
Rectum	—	—	—	—	—	—	—	—
Trachea, bronchus, and lung	—	—	—	—	—	—	—	—
Breast	—	—	—	—	—	—	—	—
Cervix uteri	—	—	—	—	—	—	—	—
Corpus uteri and uteri unsp.	—	—	—	—	—	—	1	0.3
Prostate	—	—	—	—	—	—	—	—
Kidney	8	1.5	1	0.2	—	—	1	0.3
Bladder and other urinary organs	—	—	—	—	—	—	—	—
Melanoma of skin	—	—	—	—	—	—	—	—
Other malignant neoplasm of skin	—	—	—	—	—	—	1	0.3
Thyroid gland	—	—	—	—	—	—	1	0.3
Lymphosarcoma and reticulosarcoma	3	0.6	3	0.6	1	0.2	2	0.6
Total	11	2.1	4	0.9	1	0.2	6	1.7
CANCER INCIDENCE PER 100,000 NONINDIGENT POPULATION FOR								
Lip	—	—	—	—	—	—	—	—
Esophagus	—	—	—	—	—	—	—	—
Stomach	—	—	—	—	—	—	—	—
Large intestine except rectum	—	—	—	—	—	—	—	—
Rectum	—	—	—	—	—	—	—	—
Trachea, bronchus, and lung	—	—	—	—	—	—	—	—
Breast	—	—	—	—	—	—	—	—
Cervix uteri	—	—	—	—	—	—	—	—
Corpus uteri and uteri unsp.	—	—	—	—	—	—	—	—
Prostate	—	—	—	—	—	—	—	—
Kidney	—	—	—	—	—	—	—	—
Bladder and other urinary organs	—	—	—	—	—	—	—	—
Melanoma of skin	—	—	—	—	—	—	—	—
Other malignant neoplasm of skin	—	—	—	—	—	—	—	—
Thyroid gland	—	—	—	—	—	—	—	—
Lymphosarcoma and reticulosarcoma	—	—	1	0.6	1	0.7	1	0.9
Total			1	0.6	1	0.7	1	0.9

ulation (23.9 versus 19.1). Young[10] has reported a higher mortality for cancer of the skin in the lower class of English males. We have no clear explanation for the apparent lower incidence of cancer of the skin in the indigent population in Puerto Rico. This group must be more exposed to sunlight than the nonindigent; however, the former includes a higher percentage of dark-colored people than the well-to-do class.

Esophagus

Although the incidence of cancer of the esophagus in both groups was quite similar (5.7 for the indigent and 6.2 for the nonindigent), one can observe a

The Indigent and Nonindigent Population in Puerto Rico

Specific Sites and Age Groups, Puerto Rico: 1953 to 1954

20–24		25–34		35–44		45–54		55–64		65		Age unknown	Total	
No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.	No.	Inc.		No.	Inc.
—	—	1	0.2	3	0.9	5	2.1	5	3.2	7	4.8		21	0.6
—	—	6	1.4	18	5.1	43	18.0	60	38.6	64	43.9		191	5.7
1	0.4	5	1.2	27	7.7	53	22.2	110	70.8	131	90.0		327	9.8
1	0.4	1	0.2	7	2.0	4	1.7	9	5.8	18	12.4		40	1.2
—	—	2	0.5	6	1.7	8	3.4	11	7.1	22	15.1		49	1.5
—	—	2	0.5	10	2.9	13	5.4	33	21.2	31	21.3		89	2.7
4	1.5	9	2.2	30	8.9	36	15.1	22	14.2	35	24.0		136	4.1
3	1.1	67	16.2	155	44.3	143	59.9	112	72.1	95	65.2		575	17.3
2	0.8	4	1.0	8	2.3	16	6.7	7	4.5	11	7.6		49	1.5
—	—	—	—	—	—	1	0.4	12	7.7	44	30.2		57	
—	—	—	—	1	0.3	2	0.8	2	1.3	5	3.4		20	0.6
1	0.4	3	0.7	5	1.4	8	3.4	16	10.3	29	19.9		62	1.9
1	0.4	2	0.5	3	0.9	4	1.7	1	0.6	6	4.1		17	0.5
—	—	10	2.4	57	16.3	100	41.9	140	90.1	328	225.8	6	636	19.1
—	—	1	0.2	2	0.6	11	4.6	4	2.6	2	1.4		21	0.6
1	0.4	—	—	1	0.3	—	—	4	2.6	3	2.1		18	0.5
14	5.3	113	27.3	333	95.3	447	187.4	548	352.8	831	570.7	6	2308	69.3

Specific Sites and Age Groups, Puerto Rico: 1953 to 1954

—	—	—	—	—	—	2	2.3	5	9.9	5	13.0		12	1.1
—	—	—	—	2	1.8	10	11.3	18	35.5	39	101.4		69	6.2
—	—	3	2.3	19	17.5	58	65.7	77	151.9	228	600.5		385	34.6
2	2.0	4	3.1	2	1.8	13	14.7	23	45.4	49	127.4		93	8.4
1	1.0	—	—	4	3.7	4	4.5	8	15.8	26	67.6		43	3.9
—	—	1	0.9	4	3.7	9	10.2	20	39.5	47	122.2	1	81	7.3
1	1.0	3	2.3	17	15.7	18	20.4	24	47.4	23	59.8		86	7.7
1	1.0	15	11.7	46	42.4	36	40.8	22	43.4	21	54.6		141	12.9
1	1.0	4	3.1	10	9.2	11	12.5	10	19.7	44	114.4	2	80	7.2
—	—	—	—	—	—	3	3.4	12	23.7	61	158.6		76	
—	—	—	—	3	2.8	3	3.4	2	3.9	2	5.2	1	10	1.0
—	—	2	1.6	4	3.7	7	7.9	18	35.5	33	85.8		64	5.8
1	1.0	—	—	1	0.9	2	2.3	2	3.9	2	5.2		8	0.7
1	1.0	13	10.2	30	27.6	43	48.7	68	134.2	101	262.5	9	256	23.0
4	4.1	6	4.7	4	3.7	—	—	2	3.9	3	7.8		19	1.7
—	—	1	0.9	—	—	2	2.3	5	9.9	5	13.0		16	1.4
12	12.3	52	40.7	146	134.5	221	250.5	316	623.5	689	1791.1	13	1439	129.5

tendency toward a higher incidence in the indigent lower-age groups (in the 35 to 44-year level, 5.1 versus 1.8; in the 45 to 54-year level, 18.0 versus 11.3; and in the 55 to 64-year level, 38.6 versus 35.5). The opposite tendency occurred in the population older than 64 years of age, where the incidence found was 43.9 for the indigent and 101.4 for the nonindigent. Graham *et al.*[6] have reported that cancer of the esophagus occurs three times more frequently in the poorest group than in the wealthiest in the Buffalo community.

Stomach

The incidence for cancer of the stomach was found to be higher in the nonindigent group with a level of 34.6, as against 9.8 among the indigent. This difference is noted in both sexes and in all age groups.

E. M. Cohart has found a higher incidence of cancer of the stomach in the poor group of New Haven, and this experience is in agreement with the results found in England, Buffalo, and Copenhagen.

Large Intestine and Rectum

Cancer of both the large intestine and rectum occurs more frequently in the nonindigent population. Carcinoma of the large intestine occurs with an incidence of 1.2 in the indigent group and 8.4 in the nonindigent. Again this difference is noted for both sexes and in all age groups, being highest after the age of 64. A similar difference is observed for cancer of the rectum, where the incidence for the indigent is 1.5, while it is 3.9 in the nonindigent. This difference is also present in all age groups and in both sexes.

The English data show that in the upper social status there is a higher mortality from bowel cancer. However, this was not confirmed in the New Haven, Copenhagen, or the Buffalo studies.

Trachea, Bronchus, and Lung

Cancer of the trachea, bronchus, and lung has an incidence of 2.7 among the indigent and 7.4 in the nonindigent group. Again this difference which exists between the two socioeconomic groups manifests itself in both sexes and in all age groups, being higher after age 64 (an incidence of 21.3 for the indigent and 122.2 for the nonindigent).

The data from England, Copenhagen, Buffalo, and New Haven show a higher incidence of respiratory cancer among the indigent. This remarkable disparity between our findings and those of the above-mentioned studies may be related to the smoking habits of our population. People in lower socioeconomic levels prefer cigar smoking and tobacco chewing to cigarette smoking, while the converse is true among the well-to-do segment of the population. The atmosphere in Puerto Rico is fairly free of industrial carcinogens.

Breast

Cancer of the breast is more frequent in the nonindigent (7.7) than the indigent (4.1) group. This difference exists at all age levels.

The finding that cancer of the breast is more frequent among the higher socioeconomic classes has been confirmed for Buffalo, New Haven, and Britain, but not for Copenhagen. As mentioned elsewhere by other investigators this may be related to nursing habits. The indigent population in Puerto Rico almost invariably nurse their children, while nursing is practiced less and less in the well-to-do group.

Cervix Uteri

Cancer of the cervix uteri occurs more frequently in the indigent population, with an incidence of 34.6 versus 24.5 for the nonindigent. This difference manifests itself at all age levels.

The finding that cancer of the cervix uteri is more prominent in the poorer classes has been confirmed for England, Copenhagen, and Buffalo, but no correlation was found in the New Haven data. The relationship existing between parity, age of marriage, and cancer of the cervix has been mentioned by several authors in the past. The indigent population in Puerto Rico marry younger and have more children per family than the well-to-do group.

Corpus Uteri and Uteri Unspecified

The incidence of cancer of the corpus uteri and uteri unspecified is more prominent in the nonindigent women, with a level of 14.0 as against 2.9 among the indigent. Again this difference is noted for all age groups and is highest in the population older than 64 years (7.6 for the indigent and 114.4 for the nonindigent).

Prostate

Cancer of the prostate is more frequent in the nonindigent, with an incidence of 14.4 versus 3.4 in the indigent. Once again this difference is noted at all age levels and is maximum after 64 years (158.6 for the nonindigent versus 30.2 for the indigent).

Young[10] reported a higher mortality for cancer of the prostate in British men of the upper social classes.

Discussion

A study of the incidence of cancer among the indigent and nonindigent population in Puerto Rico has shown a predominance of the disease in the latter group. With regard to site incidence, it was found that cancer of the skin, breast, stomach, large intestine, rectum, trachea, bronchus, lung, corpus uteri, and the prostate occur more frequently in the nonindigent or higher socioeconomic group. Cancer of the esophagus showed a higher incidence in the indigent population below age 65, but after this age the disease is more frequent in the nonindigent group. Cancer of the cervix uteri showed a higher incidence in the indigent group.

Due to the fact that the Puerto Rico State Cancer Registry reports contain no information on socioeconomic level or occupation, we have used the type of hospital involved as the basis for classifying the cases as indigent or nonindigent. Cases seen outside of hospitals could not be classified in either group. This introduced some errors in our data. A total of 137 cases were not included inasmuch as they could not be classified.

In the absence of complete census data for the socioeconomic classification of the population in Puerto Rico, we used a survey conducted by the Puerto Rican Planning Board for the year 1953. The experience with this survey of a limited sample of families (2482) in the labor force had to be projected to the rest of the population. This possibly constituted the main source of error in this study. The data available did not permit a proper analysis of the incidence in the population over 65 years of age. The apparent higher incidence of cancer of all sites considered, except for cervix uteri, in the 65-year-and-over age group of the nonindigent population, may be related to the age distribution within this segment of the population.

The findings in this study will serve as the basis for future investigation. From July 1, 1960, the Puerto Rico State Cancer Registry reports will include the occupation and economic status of the patient. The census data for the year 1960 will also contain information on the socioeconomic status of the population, which will serve as the basis for more accurate studies in the future.

Summary

A study of cancer incidence for the indigent and nonindigent population in Puerto Rico, for the years 1953 and 1954 is presented.

In general cancer was found to affect the nonindigent more than the indigent population.

Cancer of the cervix uteri had a higher incidence among the women of the indigent group.

Cancer of the esophagus showed a higher incidence among the indigent population below 65 years of age, but beyond this age level the nonindigent population was affected more by the disease.

Cancer of the skin, breast, stomach, large intestine, and rectum, and cancer of the trachea, bronchus, and lung, and carcinoma of the prostate showed a higher incidence in the nonindigent population.

Acknowledgments

The analysis of the data shown was made by María Teresa Pérez, Bureau of Cancer Control, Puerto Rico Department of Health. José L. Janer, Department of Biostatistics, University of Puerto Rico Medical School, served as consultant in this work.

References

1. Clemmesen, J. & A. Nielson. 1951. Social distribution of cancer in Copenhagen. 1943–1947. Brit. J. Cancer. **5:** 159–171.
2. Cohart, E. M. 1954. Socioeconomic distribution of stomach cancer in New Haven. Cancer. **7:** 455–461.
3. Cohart, E. M. 1955. Socioeconomic distribution of gential cancer in New Haven. Cancer. **8:** 34–41.
4. Cohart, E. M. & C. Muller. 1955. Socioeconomic distribution of cancer of gastrointestinal tract in New Haven. Cancer. **8:** 379–388.
5. Cohart, E. M. 1955. Socioeconomic distribution of cancer of lung in New Haven. Cancer. **8:** 1126–1129.
6. Graham, S., M. Levin & A. M. Lilienfeld. 1960. The socio-economic distribution of cancer of various sites in Buffalo, N.Y., 1948–1952. Cancer. **13:** 180–191.
7. Great Britain, Registrar General. 1927. The Registrar General's Decennial Supplement, England and Wales, 1921. II. Occupational Mortality, Fertility, and Infant Mortality. His Majesty's Stationary Office. London, England.
8. Great Britain, Registrar General. 1938. The Registrar General's Decennial Supplement, England and Wales, 1931. IIa. Occupational Mortality. His Majesty's Stationary Office. London, England.
9. Great Britain, Registrar General. 1954. The Registrar General's Decennial Supplement, England and Wales, 1951. I. Occupational Mortality. Her Majesty's Stationary Office. London, England.
10. Young, M. 1926. The variation in the mortality from cancer of different parts of the body in groups of men of different social status. J. Hyg. **25:** 209–217.

EPIDEMIOLOGY OF HYPERTENSION WITH PARTICULAR REFERENCE TO RACIAL SUSCEPTIBILITY*

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For many years investigations regarding the etiology of essential or primary hypertension have been directed toward the experimental production of the disease and the physical causes of elevated blood pressure. During recent years, however, emphasis has been placed upon other factors such as racial, dietary, and occupational differences in population groups with varying prevalence rates of hypertension in an effort to find a clue to the etiology of this disease from such data.

Numerous studies have attempted to demonstrate that blood pressures in primitive societies are generally lower than in more complex civilizations. Original reports from the Orient[1] and from rural areas in east Africa[2,3] have repeatedly stressed the marked differences in the prevalence of hypertension in these groups as compared with those of the same race who had lived under the stress of modern civilization.

In recent years other studies have challenged these conclusions. Data from other areas in Africa are incomplete, but recent reports from the Belgian Congo, Ruanda-Urundi, Northern Rhodesia, and especially from South Africa[4-6] suggest that elevated blood pressure and the complications thereof are not uncommon among the Colored and Bantu populations and that elevated blood pressure does occur even in some primitive tribes. Recent studies by Schroeder of Asian populations have also challenged the concept that hypertension is a rarity among these peoples.[7] Careful clarification of these conflicting reports is of importance.

Hypertension has been reported to be common among the Negro populations in the Virgin Islands,[8] West Indies,[9] and Panama,[10] although there is a definite suggestion in Panama that elevated blood pressure may be secondary to chronic renal disease.

Abundant evidence to support the conclusion that hypertension is a more frequent and serious disease among Negroes in the United States has been accumulated.[11,12] Mortality statistics suggest that in all parts of the country the Negro mortality from hypertension in all age groups is from three to nine times as high as that of white individuals living in the same area.[13] It has always been simple to attribute these differences to "stress," or to migration to a complex environment.

In an effort to clarify this problem studies were undertaken approximately four years ago in the West Indies and more recently in Liberia, Africa. Admittedly these investigations are somewhat limited, owing to difficulties encountered in any mass population study in less-developed areas, but a summary of these data would appear to be of interest so that leads to further investigations might be obtained. Unfortunately until now direct comparisons of data

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on the prevalence of hypertension among Negroes from Africa and the United States have not been possible since adequate blood pressure surveys have not been carried out on the west coast of Africa (Ghana, Liberia, and French Equatorial Africa), the points of origin for Negroes brought to the New World. Most of the data reported to date have been from South Africa and east Africa, areas where the population may differ considerably from the American Negro.

Many obvious difficulties arise in attempting to compare data from one study with that of another since methods of sampling and especially methods of recording blood pressure differ from one investigator to the next. Definitions of hypertension also differ in various studies and, for purposes of comparison, it is more useful in most instances to discuss prevalence of *elevated blood pressure* without seeking or selecting an absolute level or "labeling" a segment of the sampled population as "hypertensive." With these problems in mind I propose to compare results of several of the more recent studies of blood pressure levels in different population groups.

TABLE 1

COMPARISONS OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURES IN THE NEGRO AND WHITE POPULATIONS OF THE BAHAMAS AND IN THE WHITE POPULATION OF THE UNITED STATES

Age	Males			Females		
	United States*	Bahamas†		United States*	Bahamas†	
		White	Negro		White	Negro
20–24	123/76	129/73	128/79	116/72	122/73	120/74
25–29	125/78	130/74	133/83	117/74	120/76	127/80
30–34	126/79	124/77	136/88	120/75	121/77	132/85
35–39	127/80	125/78	143/91	124/78	121/78	140/88
40–44	129/81	135/84	142/92	127/80	148/88	149/91
45–49	130/82	130/79	145/94	131/82	142/85	152/94
50–54	135/83	140/86	156/93	137/84	147/87	155/93
55–59	138/84	139/82	144/86	139/84	156/84	182/86
60–64	142/85	145/80	168/90	144/85	154/80	176/90

* From Master *et al.*[17]

† Johnson, B. and R. Remington (unpublished observations).

Details of the study in Nassau and in several of the Bahama Islands,[14] as well as studies conducted by Moser *et al.*,[15] in Liberia, are reported elsewhere.

TABLE 1 compares blood pressure levels obtained in a random sampling of the Negro and white populations in the Bahamas with data collected by Master *et al.*[16] on whites in the United States. The figures on the Bahamian Negroes are similar to those reported by Moser *et al.*[14] and indicate that in all ages in both sexes blood pressure levels are considerably higher among the Negroes of the Bahamas.

FIGURES 1 through 4 summarize blood pressures in male and female Negro populations in various parts of the Western Hemisphere. Studies reviewed are those of Comstock,[11] who conducted a blood pressure survey of Negroes in a biracial community in Georgia, United States, Adams,[12] who studied male Negro factory workers in New Orleans, La., and Saunders,[8] who reviewed blood pressure data on the Negro population in the Virgin Islands.

Despite the marked differences in sampling techniques and the groups investigated, it is apparent that blood pressures are quite similar. It is of interest to note that systolic blood pressures of the males in Adams' study are somewhat lower than in Georgia, the Virgin Islands, or the Bahamas. This may be due in part to factors of selection in the former study ("healthy" factory workers).

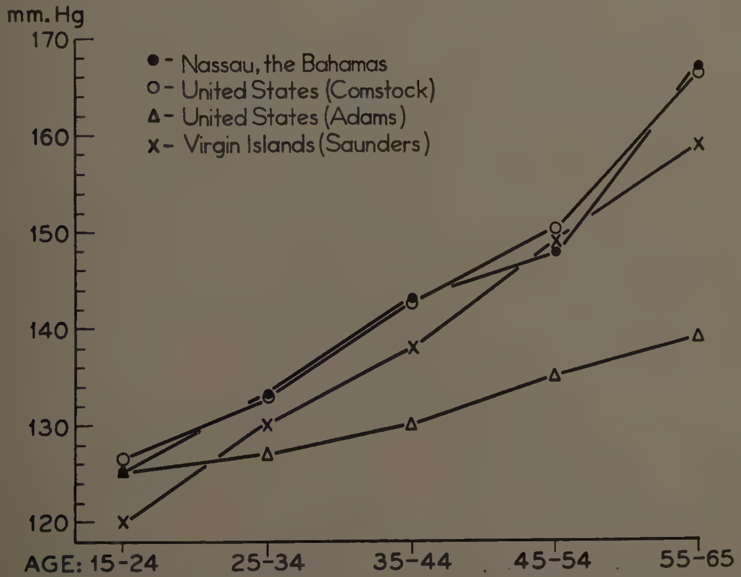

FIGURE 1. Mean systolic blood pressures in representative male Negro populations. Reproduced by permission of W. B. Saunders Company,[18] Philadelphia, Pa.

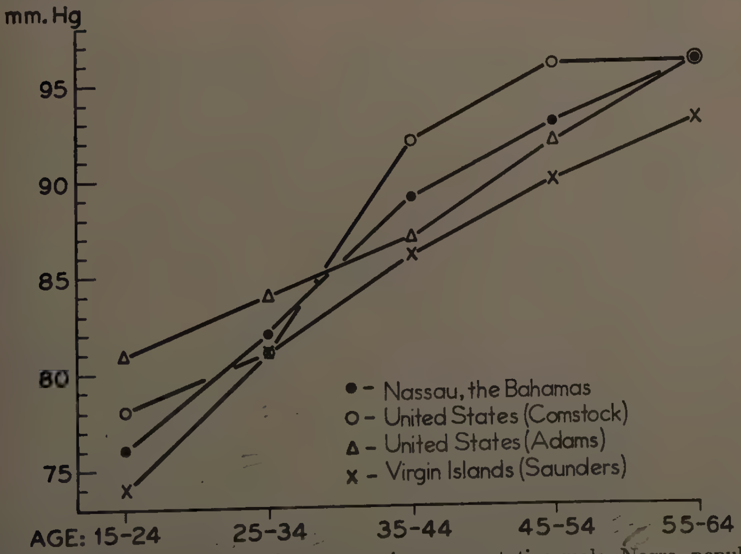

FIGURE 2. Mean diastolic blood pressures in representative male Negro populations. Reproduced by permission of W. B. Saunders Company,[18] Philadelphia, Pa.

TABLE 2 summarizes the percentage prevalence of elevated systolic and diastolic blood pressures observed in the G. W. Comstock (United States) study with those observed in Nassau, a relatively urbanized center with both white

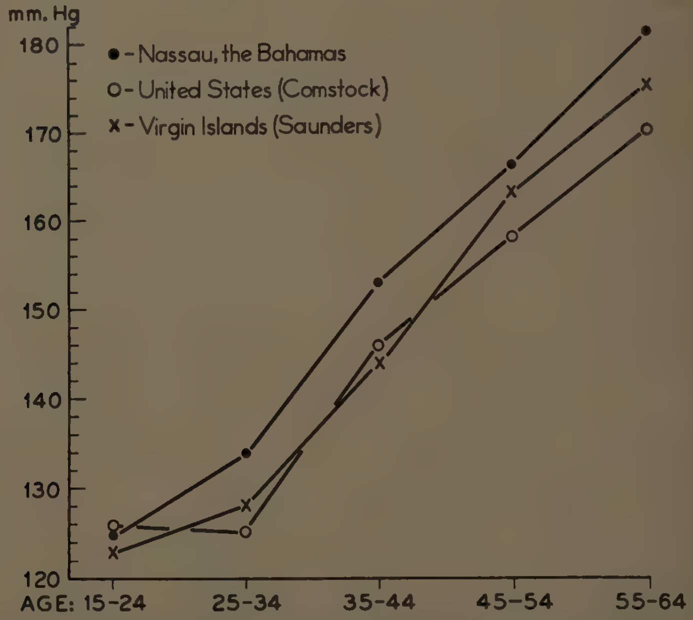

FIGURE 3. Mean systolic blood pressures in representative female Negro populations. Reproduced by permission of W. B. Saunders Company,[18] Philadelphia, Pa.

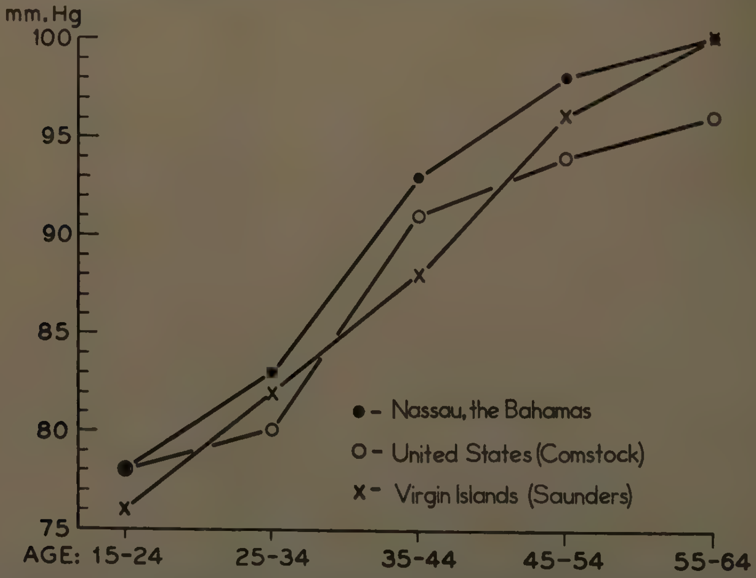

FIGURE 4. Mean diastolic blood pressures in representative female Negro populations. Reproduced by permission of W. B. Saunders Company,[18] Philadelphia, Pa.

and Negro populations; in the Grand Bahamas, an island almost entirely Negro with little evidence of industrial development; and in Rolleville, a small isolated community in Exuma, one of the islands of the Bahamas, where life is simple and has no interracial contact (note that prevalence of "hypertension" by various criteria in the G. W. Comstock study is similar to that of the Bahamian islands). Diastolic blood pressure elevations are more common in the males of the latter group.

Data collected in a survey of the entire populations of two small villages separated by approximately 50 miles in Liberia, Africa, and of young, healthy male tappers at the Firestone Plantation in Liberia, suggest that mean blood pressure is lower in most age groups than in other Negro populations studied to date (TABLES 3 and 4) but that occasionally elevated blood pressures, falling within the so-called "hypertensive" range, do occur.

TABLE 2

PERCENTAGE PREVALENCE OF SYSTOLIC* AND DIASTOLIC† HYPERTENSION OBSERVED IN NEGROES BY AREA AND SEX

	United States‡	Grand Bahamas	Nassau	Rolleville, Exuma§
Systolic hypertension				
Males	29.8	27.1	29.3	40.
Females	35.0	25.8	33.8	42.
Diastolic hypertension				
Males	4.8	35.4	19.5	37.5
Females	23.0	34.0	24.2	48.8

* 150 mm. Hg or more.
† 100 mm. Hg or more.
‡ Comstock.[11]
§ Total adult population: 130.

Data from St. Kitts, an island in the southern West Indies, indicate that blood pressures in the natives in this area are very similar to blood pressures obtained in the Bahamas and among Negroes in the United States.

The high rate of nutritional and tropical illnesses among the Liberian people studied may have some bearing on the blood pressure levels obtained. In contrast to the reports of Williams[3] and Donnison[2] on natives in east Africa, a blood pressure rise occurred with increasing age in both males and females in the small group of Liberians who were examined (the ability to judge the age of African natives is difficult). The over-all prevalence of diastolic and systolic blood pressure elevation is low in Liberia as compared to areas in South Africa where hypertension is extremely common (TABLE 5).

Contrary to the findings elsewhere in the West Indies and in Panama little evidence has been found to suggest that the apparent increase in blood pressure in the Bahamas is secondary to renal disease. In Liberia preliminary studies in those patients with elevated blood pressure do not suggest that renal disease is a contributing factor. Cardiac, renal, and cerebral complications of hypertension are extremely common in the Bahamas. These findings were similar to those reported from many areas in the Orient, where cerebral hemorrhage was also a common finding. It was not possible to do careful cardiovascular studies in Liberia although several hypertensive individuals were noted to have suffered cerebrovascular accidents.

In recent reviews of vascular disease in the Orient, Schroeder[7] reported that high blood pressure was commonly found in almost every area studied. It is of interest to compare data on blood pressures in Japan and the white population in the United States with the blood pressures of Negroes from the Bahamas and the United States. It will be noted that mean blood pressures as well as the percentages of elevated systolic and diastolic blood pressures in both sexes and in most age groups are considerably higher in the Negroes in the United States and in the Bahamas than in the whites and Japanese (TABLES 6 through

TABLE 3
BLOOD PRESSURE IN COLORED POPULATIONS: MALES

Age	Systolic				Diastolic			
	Liberia	Nassau	United States	St. Kitts*	Liberia	Nassau	United States	St. Kitts*
10–19	102.4	117.0	126.5	—	58.0	70.0	77.7	—
20–29	115.1	130.5	132.9	135.6	62.9	81.0	81.1	79.2
30–39	116.8	139.5	142.8	139.3	68.6	89.5	91.5	83.0
40–49	125.0	143.5	150.6	143.5	75.2	93.0	96.2	86.0
50–59	129.7	150.0	166.7	152.3	79.9	89.5	95.9	89.2
60 or over	137.6	168.0		—	74.3	90.0		—

* K. L. Stuart, R. E. Schneckcloth, J. F. Whitman, F. E. Moore, and A. C. Corcoran (in preparation).

TABLE 4
BLOOD PRESSURE IN COLORED POPULATIONS: FEMALES

Age	Systolic				Diastolic			
	Liberia	Nassau	United States	St. Kitts*	Liberia	Nassau	United States	St. Kitts*
10–19	101.5	115.5	125.9	—	65.4	69.	78.3	—
20–29	113.2	123.5	124.9	126.5	68.6	77.	80.1	76.4
30–39	116.6	136.	146.3	138.6	71.5	86.5	90.5	84.7
40–49	119.1	150.5	158.2	154.9	71.5	91.5	93.6	90.6
50–59	136.7	168.5	170.0	168.5	78.3	95.5	96.6	93.8
60 or over	140.2	176.		—	82.6	90.0		—

* K. L. Stuart, R. E. Schneckcloth, J. F. Whitman, F. E. Moore, and A. C. Corcoran (in preparation).

9). Here again data is not directly comparable since methods of obtaining the blood pressure levels differed in each study. These figures, however, are the most reliable available at present.

In all of the studies thus far in various racial groups, attempts to relate the prevalence of elevated blood pressure to other factors commonly believed to be

TABLE 5

MEAN BLOOD PRESSURE AND PREVALENCE OF ELEVATED BLOOD PRESSURE IN LIBERIA

Age	Males				Females			
	No.	Mean B.P.*		150 mm. or over† (%)	No.	Mean B.P.*		150 mm. or over† (%)
		Systolic	Diastolic			Systolic	Diastolic	
10–19	10	102.4	58.0	—	12	101.5	65.4	—
20–29	65	115.1	62.9	1.54	40	113.2	68.6	—
30–39	65	116.8	68.6	1.54	50	116.6	71.5	4.
40–49	37	125.0	75.2	8.1	34	119.1	71.5	2.7
50–59	31	129.7	79.9	12.9	23	136.7	78.3	9.9
60 or over	21	137.6	74.3	9.9	30	140.2	82.6	33.3
Total	230				189			

* Average of three readings.
† On first reading.

TABLE 6

MEAN BLOOD PRESSURE AND INCIDENCE OF ELEVATED BLOOD PRESSURE BY AGE AND SEX IN VARIOUS RACES

Systolic: Males

Age	United States				Bahamas		Japan§	
	White*		Colored†		Colored‡			
	Systolic	150 mm. or over (%)	Systolic	150 mm. or over (%)	Systolic	150 mm. or over (%)	Systolic	150 mm. or over (%)
20–24	122.9	3.9	126.5	Not listed in study	127	11.59	116.2	—
25–29	125.1	3.8	132.9		132	18.3	118.6	—
30–34	126.1	5.7			135	28.8	119.8	0.87
35–39	127.1	7.3	142.8		141	33.9	122.2	2.2
40–44	129.1	9.7			144	40.	125.7	5.2
45–49	130.0	13.4	150.6		144	39.1	130.1	10.7
50–54	134.5	20.2			153	48.7	136.5	20.6
55–59	137.8	26.3	166.7		169	77.7	140.3	30.1
60–64	141.8	34.9			166	69.2	145.4	41.9

* Master *et al.*[16]
† Comstock.[11]
‡ Moser *et al.*[14]
§ From Schroeder.[7]

TABLE 7

MEAN BLOOD PRESSURE AND INCIDENCE OF ELEVATED BLOOD PRESSURE BY AGE AND SEX IN VARIOUS RACES

Diastolic: Males

Age	United States				Bahamas		Japan§	
	White*		Colored†		Colored‡			
	Diastolic	150 mm. or over (%)	Diastolic	150 mm. or over (%)	Diastolic	150 mm. or over (%)	Diastolic	150 mm. or over (%)
20–24	76.0	1.2	77.7	Not listed in study	77	4.3	69.6	—
25–29	77.8	1.8	81.1		81	8.4	71.2	—
30–34	78.5	1.7			85	18.6	72.6	0.5
35–39	80.4	4.3	91.5		86	26.7	74.8	1.5
40–44	81.2	3.8			91	27.7	77.3	3.3
45–49	82.0	7.7	96.2		92	34.7	79.9	6.4
50–54	83.4	8.6			94	43.5	82.7	10.6
55–59	84.0	12.7	95.9		97	51.8	84.6	14.3
60–64	84.5	14.9			96	44.2	86.2	18.5

* Master *et al.*[16]
† Comstock.[11]
‡ Moser *et al.*[14]
§ From Schroeder.[7]

TABLE 8

MEAN BLOOD PRESSURE AND INCIDENCE OF ELEVATED BLOOD PRESSURE BY AGE AND SEX IN VARIOUS RACES

Systolic: Females

Age	United States				Bahamas		Japan§	
	White*		Colored†		Colored‡			
	Systolic	150 mm. or over (%)	Systolic	150 mm. or over (%)	Systolic	150 mm. or over (%)	Systolic	150 mm. or over (%)
20–24	115.7	1.3	125.9	Not listed in study	127.0	13.6	112.9	—
25–29	116.8	1.5	124.9		130.0	14.8	116.0	—
30–34	119.8	3.4			138.0	32.3	116.2	0.8
35–39	123.9	5.3	146.3		147.0	41.1	118.3	1.4
40–44	127.0	9.6			161.0	60.3	122.6	4.2
45–49	130.6	17.3	158.2		166.0	67.0	127.8	9.8
50–54	137.3	26.3			166.0	72.0	133.8	17.8
55–59	138.5	29.7	170.0		176.0	75.0	139.7	27.5
60–64	144.0	39.8			185.0	88.0	147.0	43.4

* Master *et al.*[16]
† Comstock.[11]
‡ Moser *et al.*[14]
§ From Schroeder.[7]

involved with pathogenesis have been largely unsuccessful. Correlation of disease states such as syphilis with hypertension have been reported. The evidence is not convincing. Schroeder was unable to find a single correlative factor of importance in the Orient. Emotional stress, westernization, and dietary habits did not appear to explain the prevalence of elevated pressure in this area. Renal disease did not appear to be of primary importance. Sodium chloride intake varied considerably from 3 gm. to as high as 25 gm. a day in different countries, but the data in the Orient was fragmentary and did not appear to correlate with the varying prevalence of hypertension. Similar findings have been recorded in the Bahamas where the salt content of the water in most areas is considerably higher than in the United States. Salt intake of the Negro Bahamians varies from between 8 to 35 gm. a day. Exhaustive studies of sodium intake and output have been in progress during the past three years, but a positive correlation between the occurrence of elevated blood pressure and high salt intake has not been established. Final conclusions of this investigation are not available at present.

TABLE 9

MEAN BLOOD PRESSURE AND INCIDENCE OF ELEVATED BLOOD PRESSURE BY AGE AND SEX IN VARIOUS RACES

Diastolic: Females

Age	United States				Bahamas		Japan§	
	White*		Colored†		Colored‡			
	Diastolic	150 mm. or over (%)	Diastolic	150 mm. or over (%)	Diastolic	150 mm. or over (%)	Diastolic	150 mm. or over (%)
20–24	71.7	0.3	78.3	Not listed in study	79	9.0	67.2	—
25–29	73.7	1.2	80.1		81	14.8	68.2	—
30–34	74.9	1.9			86	26.4	70.0	0.5
35–39	78.0	2.9	90.5		90	25.0	72.4	0.9
40–44	79.5	4.7			97	48.1	74.9	2.4
45–49	81.5	8.9	93.6		99	52.	78.0	5.2
50–54	83.5	12.0			96	41.8	81.0	8.5
55–59	83.5	11.0	96.6		101	55.	83.2	12.8
60–64	85.0	15.2			100	51.	86.	18.6

* Master *et al.*[16]
† Comstock.[11]
‡ Moser *et al.*[14]
§ From Schroeder.[7]

Efforts have been made repeatedly to determine whether the apparently higher levels of blood pressure in the Negro race are a result of heredity or secondary to some environmental factor or factors. In studies in the Bahamas it was apparent that on certain small islands the prevalence of hypertension was considerably higher than on other islands although dietary habits, salt intake, and other factors appeared to be the same. This would suggest a genetic susceptibility. It is also apparent from studies of isolated island groups in the Bahamas and other areas in the West Indies, that factors other than stress as we know it, "urbanization," or interracial conflict must be found to explain the inordinately high percentage of hypertensive individuals. Although these peoples may experience many "internal or intraracial" stress situations, the above explanations often applied to the American Negro to explain the increased morbidity and mortality from hypertensive diseases would not appear to hold true for these groups.

The data from Liberia is of great interest in this regard. In the group of young male tappers who are employed by white individuals and in the group of people in isolated villages with no contact with outside influences, blood pressure levels were lower than in Negroes elsewhere in the world. Malnutrition or associated tropical diseases in Liberia may or may not account for this observation. At present conclusions cannot be drawn regarding the reasons for an apparent difference in blood pressures in Liberian natives, and those in South Africa and other parts of the world. Studies in progress in Haiti where malnutrition and tropical diseases are prevalent may help to clarify this problem. A change in culture, diet, or occupation may account in part for these differences.

Conclusions

(1) From the available data it would appear that blood pressure levels vary considerably in different racial groups. Elevated blood pressure and an increasing prevalence of hypertension and its complications are apparently more common in Negroes in the Western Hemisphere and in South Africa than in the white or Oriental populations. Despite the marked differences in techniques employed in many of the studies compared, this conclusion appears to be warranted.

(2) Blood pressure elevations occur in relatively primitive societies, and urbanization, civilization, or interracial stress situations do not appear to be *necessary* for this to develop.

(3) Recent studies in Liberia indicate that mean blood pressures in the native population are lower than blood pressures in Negroes residing in the West Indies, other parts of Africa, or in the United States, but that a rise in blood pressure does occur in the older age groups and that elevated blood pressure is not a rarity. Altered environmental stresses and dietary change may play some role in explaining the apparent evolution of higher levels of blood pressure when these peoples emigrate to the Western Hemisphere; other factors may, however, be of equal importance.

(4) Although salt intake appears to be high in some areas with a high prevalence of hypertension in the Orient and in the West Indies, the absolute correlation of this finding with elevated blood pressure must await further study. Genetic factors may be of more importance in explaining the variability of prevalence in different areas with apparently similar salt intake.

(5) Additional genetic and long-term studies are needed in carefully sampled Negro populations in order to define more clearly a possible racial "susceptibility" to hypertension.

References

1. Schroeder, H. A. 1958. Degenerative cardiovascular disease in the Orient. II. Hypertension. J. Chronic Diseases. **8:** 312.
2. Donnison, C. P. 1929. Blood pressure in the African native. Lancet. **1:** 6.
3. Williams, A. W. 1942. The blood pressure of Africans. East African Med. J. **18:** 109.
4. Dubois, A. 1932. Note sur la tension arterielle chez les indigenes congolais. Ann. Soc. belge Med. Trop. **12:** 133.
5. Becker, B. J. P. 1946. Cardiovascular disease in the Bantu and coloured races of South Africa. V. Hypertensive heart disease. Southern African J. Med. Sci. **11:** 107.
6. Shrire, V. 1958. The racial incidence of heart disease at Groote Schur Hospital, Cape Town. II. Hypertension and valvular disease of the heart. Am. Heart J. **56:** 742.
7. Schroeder, H. A. 1959. Hypertension in the Orient. *In* Moyer's Symposium on Hypertension. Saunders. Philadelphia, Pa.
8. Saunders, G. M. & H. Bancroft. 1942. Blood pressure studies on Negro and white man and woman living in the Virgin Islands of the United States. Am. Heart J. **23:** 410.
9. Moser, M. 1958. *In* Genetic and Environmental Factors in Human Hypertension. Circulation. **17:** 728.
10. Taylor, C. E. 1945. Racial distribution of nephritis and hypertension in Panama. Am. J. Pathol. **21:** 1031.
11. Comstock, G. W. 1957. An epidemiologic study of blood pressure levels in a biracial community in the southern United States. Am. J. Hyg. **65:** 271.
12. Adams, J. M. 1932. Some racial differences in blood pressure and morbidity in a group of white and colored workmen. Am. J. Med. Sci. **184:** 342.
13. Lennard, H. L. & C. Y. Glock. 1957. Studies in hypertension. Differences in the distribution of hypertension in Negroes and whites. An appraisal. J. Chronic Diseases. **5:** 186.
14. Moser, M., R. Morgan, M. Hale, S. W. Hobler, J. Dodge & A. I. Macaulay. 1959. Epidemiology of hypertension with particular reference to the Bahamas. Part I. Am. J. Cardiol. **4:** 727.
15. Moser, M., D. Pugatch, B. Gordon & H. Farber. Epidemiology of Hypertension. II. Blood Pressure in Liberia. To be published.
16. Master, A. M., L. I. Dublin & H. H. Marks. 1950. The normal blood pressure range and its clinical implications. J. Am. Med. Assoc. **143:** 2464.
17. *Ibid.* 1464.
18. Moyer, J. H. (Ed.). 1959. Symposium on Hypertension. Saunders. Philadelphia, Pa.

A PRELIMINARY REPORT ON THE RELATION OF SOCIOCULTURAL FACTORS TO HYPERTENSION AMONG THE ZULU*

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This paper represents a preliminary and partial analysis of data collected in an epidemiological study of hypertension in two African communities. The two groups studied are both Zulu communities in the Union of South Africa, the first in a rural native reserve, and the second in an urban "location" called Lamontville. Sampling techniques, basic data, and methodology will be reported elsewhere.

This paper is based primarily on ethnological observation and on data collected in single interviews with 548 rural and 505 urban Zulu. The total study yielded considerably more data from a number of follow-up interviews, psychological tests, and medical examinations of a selected number of hypertensives matched with normal controls. This latter material will be reported at another time. The interview was conducted by Zulu trained especially for the project. In the urban area the interviewer was a Zulu nurse, whereas in the rural area the interviewers were Zulu medical assistants. All interviewers participated in a prestudy whereby their interviewing techniques could be checked and their readings of blood pressures could be standardized with those of European physicians participating in the larger research project.

The interviews were taken in the homes of the participants and consisted of the taking of three blood pressure determinations with five-minute intervals between, and the measuring of height and weight. A number of questions were asked concerning features of the participants' background, such as age, income, religion, occupation, and marital status. For the analysis that follows, the initial blood pressure reading was used.

Results

In general the mean blood pressure levels of both the rural and urban Zulu are relatively high, particularly in contrast to earlier reports on African groups and in keeping with the findings of the most recent studies to come out of Africa. When these mean blood pressure levels are compared to Master's so-called representative sample of Americans, we find that the rural Zulu are somewhat below, and urban Zulu somewhat above, these United States mean values (TABLE 1). Another comparison with a United States sample studied by Comstock in Houston, Texas, indicates that the rural Zulu, in general, have mean blood pressures somewhat below both his white and Negro groups, and that the urban Zulu, in general, have higher pressures than these American whites but not quite as high as United States Negroes (TABLE 1).

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The contrast between rural and urban Zulu blood pressure is striking. This is shown in two ways:

(1) There is a greater frequency of elevated blood pressures (using a criterion of 90 mm. Hg diastolic) among urban Zulu for all age groups and both sexes. The differences between rural and urban females is significant at the 0.01 level. For males the difference between rural and urban is significant (0.10) only in the 25 to 44 age group (TABLE 2).

TABLE 1

ZULU URBAN AND RURAL, AND REPRESENTATIVE AMERICAN,* AND HOUSTON† AMERICAN WHITE AND NEGRO MEAN BLOOD PRESSURES BY AGE AND SEX

Age	Systolic pressure									Diastolic pressure				
	Master's American	Zulu				Houston		Houston		Master's American	Zulu		Houston white	Houston Negroes
		Rural	N	Urban	N	White	N	Negroes	N		Rural	Urban		
Males														
20–24	123									76				
18–24		120	(30)	123	(23)	123	(44)	127	(37)		73	77	74	78
25–29	125									78				
25–34		120	(26)	122	(48)	122	(40)	133	(21)		78	77	79	81
30–34	126									79				
35–39	127									80				
35–44		116	(28)	130	(40)	124	(65)	143	(34)		74	82	83	92
40–44	129									81				
45–49	130									82				
45–54		127	(23)	153	(20)	133	(59)	151	(25)		82	92	86	96
50–54	135									83				
55–59	138									84				
55–64		129	(24)	149	(7)	138	(39)	167	(15)		76	91	79	96
60–64	142									85				
65+		127	(20)	147	(9)	148	(21)	147	(5)		77	85	84	82
Females														
20–24	116									72				
18–24		117	(82)	118	(76)	113	(56)	126	(37)		72	72	66	78
25–29	117									74				
25–34		115	(102)	135	(124)	113	(87)	125	(44)		74	79	72	80
30–34	120									75				
35–39	124									78				
35–44		118	(95)	133	(76)	121	(96)	146	(47)		76	84	77	91
40–44	127									80				
45–49	131									82				
45–54		128	(65)	149	(33)	136	(62)	158	(32)		82	94	83	94
50–54	137									84				
55–59	139									84				
55–64		140	(29)	146	(28)	147	(46)	170	(17)		85	89	82	97
60–64	144									85				
65+		136	(24)	156	(10)	157	(45)	173	(16)		83	92	82	89

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* The American mean blood pressures are derived from Master's *et al.* study: Master, A. M., Garfield, C. I., and Walters, M. B., *Normal Blood Pressure and Hypertension.* Lea and Febiger. Philadelphia, Pa., 1952.

† The data on the Houston sample are derived from the study by G. W. Comstock, 1957, "An Epidemiologic Study of Blood Pressure Levels in a Biracial Community in the Southern United States." *Am. J. Hygiene.* **65:** No. 3, 271–315. Note that the mean pressures in Master's sample are given in five-year intervals. Since Master does not give the sample size for his population, it is not possible to include this data.

(2) Using mean blood pressure values urban males and urban females are significantly higher in all age groups.

Increasing age is associated with increasing frequency of elevated blood pressures and with higher mean blood pressures for both sexes and in both communities (TABLES 2 and 3). Male frequency of elevated blood pressure approximates the female in the lower age groups, but in the 45 to 64 category the females appear considerably higher than the males (TABLE 2).

TABLE 2

FREQUENCY OF ELEVATED* DIASTOLIC BLOOD PRESSURES OF RURAL AND URBAN ZULU, BY AGE AND SEX

Age and blood pressure	Male				Female			
	Rural		Urban		Rural		Urban	
	N	%	N	%	N	%	N	%
18–24								
Normal	27	(90)	19	(83)	75	(91)	70	(92)
Elevated*	3	(10)	4	(17)	7	(09)	6	(08)
	$\chi^2 = 0.67$		$P > 0.10$		$\chi^2 = 0.03$		$P > 0.10$	
25–44								
Normal	46	(88)	68	(77)	167	(85)	153	(73)
Elevated	6	(12)	20	(23)	30	(15)	58	(27)
	$\chi^2 = 3.46$		$P < 0.10$		$\chi^2 = 9.86$		$P < .01$	
45–64								
Normal	36	(74)	15	(56)	60	(63)	25	(41)
Elevated	13	(26)	12	(44)	34	(36)	36	(59)
	$\chi^2 = 2.62$		$P > 0.10$		$\chi^2 = 8.23$		$P < 0.01$	
65 and above								
Normal	16	(80)	6	(67)	15	(63)	4	(40)
Elevated	4	(20)	3	(33)	9	(37)	6	(60)
	$\chi^2 = 0.52$		$P > 0.10$		$\chi^2 = 1.52$		$P > 0.10$	

* The criteria for elevated diastolic blood pressure was 90 mm. Hg and above.

Discussion

How can we explain the difference in blood pressure found between rural and urban Zulu? Such factors as race and climate can be eliminated immediately. Two very promising factors that have received much attention recently are diet and social stress. It is very possible that each plays an important role, but the data collected in the present study lean toward social stress as having a more demonstrable relationship to blood-pressure differences.

To examine the question of diet first, it has been shown elsewhere† that urban diet is somewhat superior, although similar in terms of cereal variety and the consumption of animal tissues and other protective foodstuffs. However, in a small study of the diet of the same urban population on which I am now reporting it was found that there was no evidence of a relationship between the prevalence of hypertension and the consumption of a "superior" or "inferior" diet. So far as the data indicate, no real relationships were found between the intake of particular food items and rates of hypertension. This, of course, in no way negates the possibility that diet does indeed play a role in hypertension, but such a relationship could not be found in the study under discussion.

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† "Observations on the Epidemiology of Hypertension in an Urban Zulu Community," by J. H. Abramson, E. Slome, B. Gampel, and N. Scotch. In preparation.

The possibility of a selective factor operating so that hypertensives would tend to gravitate toward the city does not receive support from the data.

Table 3

Zulu Urban/Rural Mean Blood Pressures by Age and Sex

Age residence and sex	Systolic pressure				Diastolic pressure		
	N	Mean	Standard deviation	F*	Mean	Standard deviation	F*
Male							
(25–44)				8.68†			4.08
Rural	54	118	13.6		76	9.9	
Urban	88	125	14.6		80	11.8	
(45–64)				11.64†			9.23†
Rural	47	128	26.5		79	14.4	
Urban	27	151	32.3		92	22.2	
(All ages)				11.66†			12.87‡
Rural	151	123	19.7		76	11.8	
Urban	147	131	22.7		82	14.9	
Female							
(25–44)				44.57‡			20.51‡
Rural	197	116	16.4		75	12.1	
Urban	211	128	19.3		81	15.3	
(45–64)				13.96‡			13.64‡
Rural	94	132	27.7		83	15.0	
Urban	61	148	24.6		92	15.4	
(All ages)				30.66‡			19.64‡
Rural	397	121	21.5		77	13.6	
Urban	358	130	21.9		81	15.8	

* Tests of significance based on analysis of variance.

† With $P < 0.10$.

‡ With $P < 0.01$.

When participants in the study were asked where they would prefer to live, the city or the country, those who lived in the city and who would have preferred to live in the country had hypertension frequencies similar to those who lived in the city and preferred it to the country. The same was true of the rural area, there being no significant difference between those who prefer the city to the rural area.

A more convincing case can be made for social stress as a variable related to the prevalence of hypertension among the Zulu. It is undoubtedly true that social stress is found in both the rural and urban areas in which the Zulu live, but it is hypothesized that stress is not only more frequent in the city but is much more severe as well.

When informants were questioned in the rural area as to what were the major problems of life, almost all answered by saying that poverty and migratory labor were the big problems. In the city, however, respondents went on and on when asked the same question. Not only was there poverty, but degradation and humiliation in the treatment of Africans by Europeans, frequent arrests, high rates of illegitimacy, divorce and separation, alcoholism, and open competition for few jobs. From the foregoing it is quite evident that the Africans themselves recognize that there are greater and more kinds of stress in city life than in rural. It is of interest that in response to the question of where they would prefer to live, the country or the city, a significantly greater percentage of city dwellers expressed a preference for living in the country than the percentage of country dwellers who stated they would prefer to live in the city (TABLE 4).

Very briefly let us contrast urban living with rural living for the Zulu.

In the rural area the Zulu live in scattered homesteads consisting of fairly large extended families. The subsistence economy is basically agricultural supplemented by cattle keeping. The latter is primarily an item of prestige and ritual significance rather than a purely economic pursuit. Because the land is overcrowded and severely eroded, not enough crops are produced to meet even the minimum nutritional requirements, and poverty is the basic fact of life. Since not enough food is produced to feed the population, the people are forced to buy their food. Buying food, however, requires cash and, since there are almost no opportunities for earning cash, the men are forced to the cities to work for a cash wage. Some men go to the city for a few years, save part of their salary, and then return to the rural community, but by far the majority of men prefer to work in the city for about nine to ten months a year, sending home a portion of their salary for their wives and children, returning occasionally for a few days, and then coming home for about two months every year for the planting season.

TABLE 4

HOME PREFERENCE OF URBAN AND RURAL FEMALES, BY FREQUENCY OF ELEVATED BLOOD PRESSURE

	Live in urban		Live in rural	
	Normal B.P.	Elevated B.P.	Normal B.P.	Elevated B.P.
Prefer urban	118	69	21	3
Prefer rural	44	31	185	47

Note: The higher frequency of those urbans who would prefer to live in the country over those rurals who would prefer to live in the city is significant at the 0.02-level, using Chi Square.

The social structure is undergoing a certain amount of change, although with certain continuations of native institutions. For example, the power of the chief is crumbling although he still receives a certain measure of respect and continues to hear and judge tribal disputes. The family remains primarily an extended family and, although the authority of the headman has diminished in contrast with former times, it is still very much in existence. Since contact with Europeans is very limited in the rural area, acculturation proceeds at a relatively slow pace. What change does occur is due primarily to the changing ideas of men who have returned to the country after spending a few years in the city. Sometimes conflicts result when the younger men return from the city with new ideas and are met with resistance and rejection by the older generation. This conflict is often resolved in favor of the older generation.

The religious picture is somewhat complex. Due to the work and influence of missionaries representing several denominations, the great majority of the community are nominal Christians. Those who are not Christians retain much of the traditional beliefs. This, however, is also true of the Christians and, despite the earnest efforts of the missionaries, much traditional belief is incorporated into the framework of native Christianity. For example, almost all of the community still retain their belief in witchcraft as the cause of not only all illness but all other sorts of misfortune as well. For this reason native doctors, called *inyangas* and *isangomas*, still retain a very prominent position within the social hierarchy. They are frequently consulted and asked to diagnose and cure illness believed to be caused by witchcraft or sorcery.

In contrast to the dominant position of men in the traditional social structure the position of women is subservient. Whereas the men work hard only for a few months out of every year and spend the rest of the time in relative leisure, looking after cattle and in general supervising the output of the family unit, the women work extremely hard and have relatively little leisure. They are engaged in such matters as working in the fields, fetching water, and chopping and carrying firewood great distances. Women's position in this society involves difficult and arduous roles, which are nevertheless clearly defined and inculcated during childhood training. The whole of the social structure and tradition supports this situation. Furthermore the women know that as they grow older and their children reach adulthood, the rigors of their early adult life will be substantially ameliorated.

The aged in the rural area are in a particularly favorable position. They are considered as elder statesmen and are accorded much respect and status. This applies to both sexes. The Zulu aged have very little worry about providing for themselves since they occupy a still productive role in the family as the repositories of tribal custom and tradition.

In contrast with this picture of a slowly changing, relatively stable rural community we must view the urban community as undergoing drastic change with accompanying problems and difficulties. The situation of the urban Zulu might be described with some justification as anomic. The traditional and customary Zulu culture has broken down considerably due to a number of factors, yet in this situation of culture contact, acculturation to European modes of life is blocked except for piecemeal adoptions of simpler European technologies.

In the city the Africans live crowded together in "locations" that can charitably be described only as slums. Lamontville, the particular community studied, was in general one of the better African housing schemes in Durban, and yet the quality of the housing, the sanitation, and the space must be described as poor. With but few exceptions Africans here live a life of poverty and want. The men work for low wages at the most menial tasks and under the most trying conditions. Moreover since the locations are built at some distance from the place of employment the men have to travel great distances with inadequate transportation. Since the men do not earn enough to support their families, it is customary for the women to take jobs as domestics, and this requires that they too travel long distances and spend the greater portion of their time away from the home. Children are either sloughed off on relatives or friends, or they are left to fend for themselves in the streets of the location. It is hardly surprising that delinquent gangs, called *tsotsis*, roam the location causing damage and threatening the community.

That the social structure of the Zulu has broken apart is most aptly illustrated by the fact that the traditional extended family is the exception in the city rather than the rule, as it is in the reserve. Today the city family is nuclear, consisting of husband, wife, children, and lodgers, and occasionally unmarried relatives. The fact that there are no chiefs nor headmen in the city is not as significant as the lack of the traditional family. The high incidence of divorce, separation, and illegitimacy may be attributed to difficulties in adjustment to a new type of family that requires the sorts of personal adjustment between man and wife that have always been absent from the Zulu repertoire of interpersonal relationships.

Just as bewitchment and sorcery explain illness and misfortune in the reserve, so do they in the city. It is of interest that a greater proportion of city dwellers admit to being bewitched than do those in the reserve, despite some advance in sophistication of the urbanites. The higher rates of feelings of bewitchment in the city must be due to greater stress. A belief in sorcery explains not only the timeless misfortunes of illness, unrequited love, and accidents, but is now extended to explain the failure to find or keep a job, the failure of avoiding arrest, and the failure to win money or break even at the race track. Higher rates of accusations of sorcery can also be partially explained by the fact that the Zulu now live in crowded flats rather than scattered homesteads, and that also living in these flats are Africans from other tribes, such as the Sutho, Swazi, and Xosa. Such a situation results in greater tensions and accusations of witchcraft.

It is of interest that the proportion of urban women who admitted to being bewitched had significantly higher rates of elevated pressure than did those who did not admit to bewitchment. For the urban males the same trend is noted, but it does not quite reach levels of significance. This trend is not observable among the rural males and females. Apparently the feeling of being bewitched is more meaningful in the urban setting (TABLE 5).

The position of the women, which in the reserve was subservient but consistent and clearly demarcated, has become less subservient though more ambiguous, and this increases tensions between man and wife. Now that many of the women occupy a new status, that of a wage earner, they have begun to emerge from their traditionally subordinate position and to challenge the supremacy of their husbands. This is made easier by the fact that in the city a woman is no longer under the domination of her husband's mother and other in-laws, but this emergence is not without attendant difficulties. While working as domestics for European families the Zulu woman learns that she need not be completely subordinate to her husband. She also learns that the European husband and wife share many activities, but when she returns to the location she finds that her husband absolutely refuses to engage in joint activities and maintains tribal tradition to the extent of sharing his leisure as always with other men.

Many women become the heads of families involuntarily and at a comparatively early age, due to the high mortality rates of men from frequent accidents in dangerous occupations, and due also to the almost fantastically high arrest and detention rates for trivial past offenses. Although the women are motivated toward elevating their status, most of them do not appreciate the role of family head. It is of interest that, in our sample, widows had significantly higher rates of hypertension than nonwidows* of comparable ages (TABLE 6).

TABLE 5

RURAL AND URBAN FEMALES WHO ADMIT TO BEING BEWITCHED BY FREQUENCY OF ELEVATED BLOOD PRESSURE

	Rural		Urban	
	Normal B.P.	Elevated B.P.	Normal B.P.	Elevated B.P.
Not bewitched	91	19	79	27
Bewitched	106	32	96	63

Note: Those urbanites who admit to being bewitched have a higher frequency of elevated pressures than those who do not admit to being bewitched. This is significant at the 0.02 level. There is no significant difference among the rurals. Chi Square was used in significance tests.

TABLE 6

MARRIED VERSUS SEPARATED AND WIDOWED ZULU WOMEN, BY RESIDENCE, AND BY FREQUENCY OF ELEVATED BLOOD PRESSURE

	Rural		Urban	
	Normal B.P.	Elevated B.P.	Normal B.P.	Elevated B.P.
Married	188	48	162	82
Separated or widowed	21	12	3	9

Note: Separated and widowed women had higher frequencies of elevated blood pressures than married women that were significant at the 0.05 level in the rural area, and 0.02 level in the urban area. However the higher frequency of elevated pressures among urban widows and separated women over rural counterparts was also significant at the 0.05 level. Chi Square was used in significance tests.

The men in the city, in contrast to the reserve, are subject to almost continual stress. As already noted their position of authority as household head has been threatened by the emergent women, but it is in their contact with Europeans that the Zulu probably meets with his greatest problems. Employment is not always easy to find, and with few exceptions even the regularly employed men fail to make a subsistence living. The work itself is most menial, with absolutely no opportunities for advancement and with long hard hours. Simply getting to the place of employment presents daily obstacles, waiting in line for long hours to get on crowded buses both to and from work. In his contact with the white man the African is in a completely inferior position, which is shown by continual overt acts of humiliation imposed on natives by whites. This is constant since, for example, the African who works as a messenger boy comes in contact dozens of times each day with demanding and unsympathetic whites. Many informants commented on the feeling of degradation they had in their contacts with Europeans, claiming that their treatment at the hands of the whites was like that of animals. This continuous and daily frustration in relations with whites finds few opportunities for expression. The hostility must be displaced and eventually is expressed against wives (witness the high rate of broken homes), against other Africans (higher rates of sorcery and bewitchment), or against the self (alcoholism, hypertension). The situation in the city contrasts strikingly with the situation in the reserve as regards contacts with Europeans. While the Zulu on the reserve knows full well the meaning of apartheid he comes in contact only infrequently with Europeans and does not face the constant day-to-day harassment of his urban counterpart. The frequency of arrest and the continual harassment by the city police, both European and African, cannot be overemphasized when viewing the picture of urban stress.

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* This is also true for rural widows, but even so the rates of elevated pressures are significantly higher for urban than for rural widows (TABLE 6).

The position of the aged in the urban area is decidedly inferior to the rural area, primarily because of the dissolution of the extended family. Rather than occupying a place of honor and respect, the aged, unable to provide for themselves, find themselves in the position of unwelcome guests in the already overcrowded homes of their sons.

Why, in the face of severe, constant stress, does the African remain in the city? One reason already noted is the need to earn a cash income simply to meet daily food needs. This is not possible for most men in the overcrowded, eroded reserves. Aside from the question of need, however, it is interesting and significant that most of the Zulu interviewed *prefer* to live in the city. Many men go through all sorts of difficulties to get to the city and once there will make every effort to remain. Primarily, Africans *do* want to acculturate themselves to Western culture, particularly as regards the European technology. Most are convinced that the tribal way of life is restricting and limited and that it is only a matter of time before its eventual disappearance. The eagerness and drive for formal education further illustrate the desire for acculturation. Again, this drive, since it is blocked as a result of the present political situation, leads only to further stress and frustration.

Thus we have seen in this brief analysis that there is considerably more stress for Zulu living in the city than for those that live in a reserve. It is hypothesized that although this factor of stress in itself may not be completely responsible for the higher rates of hypertension among the urbanites, it must be taken into account in the search for etiological factors. Those stress factors that seem significantly related to greater urban Zulu hypertension are all derivable from social features of present South African Negro city life. Some of them are absent or insignificant in rural Zulu society, others are present in the rural milieu but in apparently less emphatic forms than in the cities. In addition, the rural culture has greater continuity with past tradition and greater stability of expected roles. This is in striking contrast to life in the city, where there is a complete break with tradition in many, although not all, areas of life that has resulted in anomie.

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PERSPECTIVES IN MEDICOPSYCHOLOGICAL RESEARCH WITH REGARD TO GRAVE PHYSICAL ILLNESS

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It may seem unusual to regard the hospital as a psychological laboratory, but current thinking in the behavioral sciences is more and more disposed to that view. The emotional concomitants of physical illness have been accorded recognition for centuries, but systematic research in this area is a latter-day development. Psychodynamic research methodology, a direct outgrowth of psychoanalytic theory, demanded the identification of vital research variables for the more or less direct observation of human adaptation. It was to satisfy this requirement that interest in stress behavior evolved and has continued to be refined.

In its earliest efforts, stress research depended almost exclusively on animal experimentation and elaborate laboratory models for use in human research. The next logical development was to seek out environmental experiences of catastrophic impact such as disasters and warfare. This approach reflected early psychoanalytic thinking that theorized that it was the inordinately spectacular occurrences of life that had vital effects on adaptational patterns. This view, however, has been modified, and the realization has grown that life's adaptation consists not only of milestone events but of an infinite number of lesser events as well.

Physical illness constitutes such an event in the course of one's life, and when hospitalization is required takes on greater and more vital or spectacular significance. For each individual every symptom of physical illness has different meanings at different levels of awareness. Various body organs and body parts have acquired, in the course of development, individualized meanings shaped by a system of basic convictions about the self and about the external world. When a body part becomes diseased, the significant role that part plays in the adaptive pattern is threatened, and the over-all adaptation is disrupted. Hence the behavior of any organically ill person can be considered as designed to prevent, avoid, minimize or repair injury, not merely to the body or any of its parts, but even more basically to the over-all pattern of adaptation.

In studying gravely ill patients the investigator has unlimited opportunities for subjecting adaptational dynamics to research scrutiny. Methodologically individuals under the stress of grave physical illness provide unusual opportunities to acquire usually nonreportable psychological data. Patients will reveal deeply held convictions and express lifelong "secrets" that under ordinary circumstances might never be revealed. Janis[2] has referred to this process as *unrepression*, a phenomenon he regards as a paradoxical effect of stress, since the usual severely traumatizing experiences give rise to functional amnesias and other memory disorders. In the process of "unrepression" (a process familiar to most workers with the gravely ill) the individual appears to regain memories which had been unconscious. It has been the experience of myself and my associates that research methods that depend on surveys or attitudinal questionnaires usually fail to tap this very important source of usually nonreportable data. We have found that such data can often markedly change the impression one has of the adaptational maneuvers in a particular individual. Interestingly enough, we have noted that if the research team consists of three or four investigators the subject will spontaneously prefer one of the investigators; even when each investigator interviews in the same area, the preferred investigator will invariably elicit far more "unrepressed" data.

Many leads have already emerged from the work that has been done in this field: leads that will, it is hoped, be followed in some conclusive manner. We have had a hint in some of our studies that certain adaptive behavior cuts across cultural lines rather sharply. For example, in a study of the fears and defensive adaptations to the loss of anal sphincter control, Orbach *et al.*[4] reported that the cultural and socioeconomic background of the study group had to be considered in assessing the findings. The study group "was composed primarily of lower-middle-class Eastern European Jews whose child-rearing techniques are not universal and who attach meanings to excretory activities and feces different from other cultural groups. . . . It is significant to note, however, the appearance of shame and disgust over uncontrolled public defecation in a Russian Jew, a rural Costa Rican Negro woman and a rural native American white woman. This occurred despite their socialization in cultures which attached different values to the attainment of sphincter control, to feces, and to privacy while defecating." The authors were cautioning their readers to weigh the possible influence of cultural factors, but nevertheless they were advancing a stimulating hypothesis from limited data: that shame, disgust, self-revulsion, and fear of social rejection will occur as primary in the adaptive behavior of all patients, regardless of cultural origin, when faced with the loss of anal sphincter control. Since there are individuals who have been surgically deprived of anal sphincters in almost every culture, further investigation may reveal the degree of universality in certain adaptive behaviors. In the instance cited, the role of olfaction and self-esteem in human socialization could be an interesting side issue for further study.

Just as diverse areas for the exploration of adaptational dynamics are afforded by psychological research with the gravely ill, so too there is much to be learned regarding factors that contribute to the psychological adaptive resources of different individuals. What role is played by early childhood traumatization through physical illness in later adaptive capacities? Is this an unimportant aspect, or is there a positive relationship between early childhood trauma and later inability to cope with the stress of grave illness? Or is the reverse true? As a matter of fact, in the field of animal-stress research, Levine[3] has reported that both painful and gentling early experiences in infant animals prepare the animal for later successful stress adaptation. He found that the absence of both such experiences lead to behavioral disorders in the mature animal. Would human research in this area reveal universal principles, or would cultural differences make themselves felt?

Actually the research psychologist and research psychiatrist may well look toward the gravely ill as an inexhaustible source of data in experimental psychopathology. The general medical wards and surgical services of any large hospital will reveal a wide range of psychological disorders, often with no traceable physiological or toxic basis. Once again many of these disorders can be said to be stress maladaptive, and as such can be studied. The dynamics of elation and depression have already been explored in this connection, but then there is a large variety of transient psychotic states, acute anxieties, and other nosological entities that occur maladaptively in "normal" functioning individuals who will never again experience a recurrence of these emotional states.

An interesting example of possible clarification of problems in psychopathology that could evolve from research with the seriously ill can be found in a study of the beliefs regarding the course of grave illness. In this study[1] 100 gravely ill patients were found to have expressed beliefs spontaneously about the cause of their illness. These unsolicited beliefs fell into two broad categories: self-blame and projection of blame. It was felt that the establishment of a belief was necessary to a sense of mastery in the face of the threat imposed by the illness. "The tendency of nonpsychiatric patients to indulge in self-blame when faced with threat opens a new vista of exploration. In a sense, we have in these patients thought processes which closely parallel those frequently found in the severe neurotic and even psychotic depressions. . . . When projection is predominant in a belief established to explain a stressful experience, it may be assumed that a deep reservoir of unresolved feelings has led to the use of the technique. As with self-blame beliefs and depression, careful study of projection as a primary method of integrating stress can provide a unique opportunity for furthering our understanding of the paranoid process." It should be noted here that the authors found no significant relationship between beliefs and culture despite their recognition that culture influences belief systems.

There is another area of which mention should be made. Probably influenced by early interest in psychopathology, psychodynamic research has persisted in a rather negative orientation. In our culture the term "sick" has become synonomous with everything from nonconformity to uniformity. The overpopularization of things psychological has undoubtedly contributed to these widely held misconceptions, but it is to be feared that the behavioral sciences have done little to dispel the myth of sickness. On the basis of research with the gravely ill, there is much to suggest that there is less that we know regarding the healthy, the strong, the positive in people than we know about the unhealthy. Those who have thought about this issue have often speculated about the ability of some people to develop under the most adverse circumstances and yet to remain unscathed by disabling neurosis or psychosis. Thus with the gravely ill there is much that is positive and healthy that enables them to adapt and survive under the most trying circumstances. Research with the gravely ill would contribute much to clarifying this problem. To the observer, whether casual or professional, the resilience and fortitude demonstrated by most individuals in the face of adversity is awe-inspiring and can fill the behavioral scientist with humility. In a supposedly "sick" time in history, man's capacity to overcome the most shattering circumstances still testify to his adaptability.

At Memorial Center for Cancer and Allied Diseases, New York, N.Y., where grave illnesses are regularly treated, there are relatively few calls for psychiatric consultations. Indeed it would not be surprising if in a comparative study it was found that psychiatric services are required less frequently there than in most general hospitals, and this in a setting of staff sophistication and staff readiness to request psychiatric assistance. Actually there is experience to express the following rather surprising hypothesis: the suicide rate among the gravely ill (cancer patients, for example) may well be lower than it is in the general population.

This brings us to a neglected area of psychological research: death. In psychological research, as in all scientific inquiry, the role of the observer is a critical variable. The biases of the observer can shape the data observed and, more significantly, can even determine the phenomena *to be* observed. It is the latter that probably applies to the problem of death. All adaptation is directed ultimately toward survival; yet with untold numbers daily engaged in the final adaptive struggle these final adaptive efforts have not been subjected to research. Can the disinclination to do so reflect a pervasive and culturally determined denial of death? In psychological research the observer is also a participant in human interaction, and the prospects of identification with the dying is enough to encourage easily rationalized avoidance. However, this research will have to be done if keen understanding of adaptation and stress is to result.

To summarize: psychological science has a great deal to gain by research in the area of both acute and chronic physical disease. One possible approach to illness is to view it in the framework of adaptation to stress. There are few circumstances in life as conducive to the exploration and understanding of the intricate interplay of the dynamic forces of adaptation and stress as exist in the area of bodily illness. Devising elaborate laboratory models for testing stress hypotheses often yields disappointing results simply because the stresses employed are devoid of meaning; that is, the experimental stress stimuli are only abstractly stressful and rely on the rather untenable assumption that all the subjects will experience them as stressful. The proper setting for stress research is in the "natural laboratories"; and hospitals for the treatment of physical illness present limitless opportunities for such research.

References

1. Bard, M. & R. B. Dyk. 1956. The psychodynamic significance of beliefs regarding the course of serious illness. Psychoanalytic Rev. **43:** 146–162.
2. Janis, I. 1958. Psychological Stress. Wiley. New York, N.Y.
3. Levine, S. 1960. Stimulation in infancy. Scientific Am. **202:** 80–86.
4. Orbach, C. E., M. Bard & A. M. Sutherland. 1957. Fears and defensive adaptations to loss of anal sphincter control. Psychoanalytic Rev. **44:** 121–175.

Part IV. Panel Discussions

DISCUSSION: RETROSPECT AND PROSPECT IN RESEARCH

Thomas Gladwin, *Moderator*
National Institute of Mental Health, Public Health Service, Bethesda, Md.

The panel, in reviewing the activities of the conference, discussed changing emphases in the study of the relations among society, culture, and health—questions of value—and such questions of method as research design, personnel, and techniques.

After introducing the panelists, Thomas Gladwin opened the discussion by commenting on the changes in studies of culture and health reflected by the papers that were presented at the conference.

(1) There is the shift away from the major emphasis on the single disease entity, as Jacques May's paper indicated, to take up broader problems of the human organism in relation to environment.

(2) There is the change in the type of disease studied, from communicable diseases to noncommunicable ones, although not slighting the former. The new interest complements the former interest in such traditionally studied noncommunicable diseases as pellagra. Noncommunicable diseases also studied now are cancer, cardiovascular and neurological disorders, and mental illness, which have been studied under public health programs. These are the "new diseases" for major research.

(3) The research strategy has shifted from detailed clinical approaches to statistical research in epidemiology. There is less concern with individual prognosis now, and more use of prediction based on probability models.

(4) There has been a move away from studies of individual or family genealogy toward the study of population genetics.

(5) There has been a shift toward the study of values and attitudes surrounding illness.

Louis Verhoestraete, Pan American Health Organization, World Health Organization, Washington, D. C., in commenting on the changes of interest, noted that, with respect to communicable and noncommunicable diseases, one must not forget that a different situation exists in underdeveloped countries, where a continued emphasis on research in communicable diseases is still necessary although chronic diseases are also important. Since the world has become smaller because of improved communications, it is possible to do comparative studies from the very beginning of research in a given area. The more acute infectious diseases continue to present the greatest public health problem in these areas, but at the present time the chronic diseases can also be studied for preventive as well as for comparative purposes. For example, in underdeveloped countries cancer and cardiovascular diseases necessarily still receive less attention than nutritional deficiencies and infectious diseases. Surveys are likely to devote more emphasis to the latter. Verhoestraete went on to say that surveys would be desirable also in mental illness.

Gladwin had mentioned that some of the new orientation involved ethical problems. He said that there has been some anxious soul-searching, similar to that of physicists after development of the atomic bomb, with respect to such matters as the population explosion to which public health programs have contributed. Is it enough to justify what we do solely on the basis of relief of human suffering? Verhoestraete added that there is a tendency to play God with respect to genetics. (He referred here to H. J. Muller's recent remarks on the question.)

Verhoestraete added that before long we may have to cope with a demand from some quarters for streamlining human communities by genetics as we have done with domestic animals. Genetics may provide the means of making changes, but it should not divorce itself from the question of whether they should be made.

Howard Schneider, The Rockefeller Institute, New York, N.Y., then said that this sort of thing becomes rampant because the effectiveness of the dramatic in communications is such that the most shocking ideas tend to carry the day. However he felt that we have many inbuilt homeostatic mechanisms in society for resisting tinkering with our own genes for a long time to come. There is obviously the problem of deciding who is to determine what tinkering to do, quite aside from the question of desirability.

Schneider turned to some other aspects of genetics, health, and culture. Referring to the papers that were heard in the conference, he said, often rather wistfully, that we should like to know if the questions discussed referred primarily to genetic or environmental phenomena. We must make the assumption in human genetics that all matings are at random, because this is the best way to handle our data mathematically. The Hardy-Weinberg equilibrium is only explicable on this assumption. Gene pools have lately become our primary conceptual tool rather than the older concept of race. We must begin with the recognition that we are dealing with biological material and that genetics is the central biological science. Schneider mentioned that L. C. Dunn had said that although genetic material is the primary determinant of our biological world it does not operate in a vacuum. That which is inherited is not a character but a potentiality if the environmental stipulations are met. If we postpone gene tinkering, we must operate with the gene pools that are given. With respect to the environment our society is more permissive. However, if we are to reconstruct environment our definition for environment must be more precise than it has been. It is not merely heat, light, and humidity. There is also nutrition, for example. In nutrition we deal with a diverse environment of organic molecules in our mouths.

In the development of the field of nutrition, there has been a reluctance to come to grips with the problem of genotypes. Doing this will bring about the next burst of information. There were bursts of information in nutrition in the 1930s and 1940s; for example, there was a new vitamin every day. There has been a stop to these bursts because of the need for an improved methodology with which, in reconstructing the environment, we may increase our powers of resolving the fine structures of the environment. This begins with genetics: that which is given. We must put first things first, since there is a hierarchy of importance, and decide what is important and what is trivial. The analysis of the genetic structures of populations comes first; then we can reconstruct the environments, taking advantage of genetic facts. Although it is not adequately recognized, we are already doing so. For example, a few chemical compounds and several vitamins were mentioned at the conference by name. We have found there is greater ease in reconstructing the environment by means of chemical redefinition, as with the vitamins, than by changing culture. If people are going to eat only rice, we must accept this and get around its dietary inadequacies some other way. Rice-eating is a cultural practice. By specifying what is lacking—thiamin or *x* or *y* or *z*—we are enabled in effect to reconstruct the environment.

Gladwin remarked that these genetic problems implied interdisciplinary work. For example, the behavioral sciences, and especially the social sciences, are intimately concerned with social selection and its effects in changing gene distributions in breeding populations. This fact emphasizes questions raised in the conference with regard to research problems dealing with the analysis of multivariate relationships. We need multidisciplinary methods to attack all these problems. The question is whether we should have communicating specialists or specialties combined within one skull that can communicate with itself. When there are four or five people involved in research, communication becomes a real problem. However, communication appears to be necessary because no one person can master all the necessary information; there is not enough time and our skulls are not big enough. The people at the conference provide a good example of the communication that is necessary, despite some mutual flinching at each other's concepts. Related to this also is the problem of funds. Beyond the lone researcher working in the garage even small investigations are expensive. For example, in a study in New Guinea, D. C. Gajdusek (who was unable to attend the conference) had to obtain frozen sections and send them back to Bethesda, Md. This was hugely expensive even though the sections themselves were not hard to get. However, even more important than money in such research is interdisciplinary cooperation.

Donald Young, Russell Sage Foundation, New York, N.Y., expanded on this last point, noting that there are many kinds of interdisciplinary cooperation. What is useful in one is not in another. For example, first, there may be studies of health institutions and personnel carried out by a social scientist in the same way that a business or a tribe might be studied. These studies are generally welcomed, except for anxiety over the evaluative aspects. People do not like to be evaluated. Second, there is a kind of study that is concerned with factors in health and illness. Here the social scientist is often out of his own field, has to work with doctors and other medical personnel, and may be subject to criticism by the older professions. A third kind of problem is that of making health programs effective. This kind of problem is easier to "sell" than the second because doctors working in public health programs are more oriented than other physicians to the importance of the sociocultural environment. These three types of problems are not a complete set of categories; they are only examples.

The different health specialists with whom we cooperate create different problems. Working with psychiatrists is different from working with personnel in preventive medicine, rehabilitation, or nursing. We cannot speak about improving interdisciplinary cooperation in general; we must specify *which* disciplines. Nevertheless, there is much in common between behavioral scientists and health workers. The latter are more research-minded than other professionals, such as lawyers, for example. They are concerned with behavior; they are used to working with nonpractitioners and with different professional colleagues. This is a fortunate situation. On the other hand, there are more rigid social and professional hierarchies in the health services than in the academic world and the behavioral sciences.

In interdisciplinary work distinctive climates of professional subcultures are at the bottom of many of the difficulties. Last year at the Russell Sage Foundation, New York, N.Y., people working on 60 projects were asked about the problems they encountered. Young classified the problems as follows:

	Health field	*Law*
(1) Differences in professional subculture values:	6%	59%
(2) Problems growing out of the structure of the situation and status differentials (that is, the setting and status of the social scientists involved):	63%	12%

These categories are essentially differences in professional values and ways of working and problems of professional subcultures. How do we reconcile these differences? We cannot just give up our patterns nor take "their" values. We must develop greater specialization in the behavioral sciences. For example, we should specifically train for work with health specialists. At present there is no such preparation except in on-the-job training. We must begin deliberate training for specialization, despite the traditional opposition of behavioral science to and the lower prestige of such specialization. There is a division of opinion among social scientists in this respect. Many are still opposed to specialization; they would rather talk about applied anthropology or sociology. Young thinks we *have* to specialize. We cannot depend on the generalist any more. The rank and file cannot shift from problem to problem; therefore we need specialists. The specialists must learn the professional subculture of the practicing profession. The danger, however, is that the specialist, in learning it, will adopt it, as for example, in government service. Many economists on law faculties have become more legalistic than the lawyers, because there simply were not enough economists to "hold hands with." We need more professionally bicultural people. We also need to know more about the conditions under which collaboration can work. We need research on this too.

Gladwin asked whether specialization can carve out certain components of anthropology, sociology, psychiatry, psychology, or medicine, so that all these would be within one skull. Is a specialist one who tries to collect all the relevant information in society on a given topic?

Young answered that it is not merely a question of information, but that it is also the ability to work with people and ideas from different orientations and with different terminologies. For example, to his ears the term "stabilize" means one thing; to the doctor, with respect to certain kinds of illness, it means something else. We need to know the specific subject matter—a fragment of the health field—and the ways of working of the subgroups with whom we are collaborating.

Gladwin said that the organization and training of personnel for research, which Young had just discussed, might be seen as a methodological problem. However, the major methodological problem is the organization of the research itself. He said that we are trying to cope with a number of variables to see where each fits. There are so many that we tend to lose track. Each of us realizes the points the speaker omitted, if they are in his own specialty. Because of the complexity of the variables we have to use broad statistics, extensive measures, and large samples, but we are moving into areas where it is more and more difficult to get good measures, good data, and good subjects. David Spain's paper, dealing with such a difficult area, referred to the iceberg effect in atherosclerosis, and to the fact there were more subclinical than clinically visible cases. This is a major kind of problem for mental health and the infectious diseases as well.

Benjamin Pasamanick, Columbus Psychiatric Institute and Hospital, Columbus, Ohio, said that the problem of subclinical occurrence of disease—the iceberg effect—is not new and that epidemiologists have been concerned with it for many years. When we look back at the thinking on communicable diseases, it is not surprising that we had all kinds of "odd" theories until we came up with the idea of subclinical and carrier states for cholera. It was not difficult then to understand why cholera might arise when there was no apparent contact. This is also true of polio. The problems of polio epidemiology were largely solved when we could determine antibodies in individuals. We then learned how polio is communicated. Polio was rare centuries ago: now we know that it is mostly feces-borne. Fecal contamination was so widespread that infants contacted the virus while they still retained maternal antibodies. Thus with the decrease in infant fecal contamination there was a reduction of resistance. In underdeveloped countries polio is rare but is now increasing where sanitation is increasing. In this country, in the upper socioeconomic levels, which can more easily get vaccine for polio, incidence was previously high but has again decreased with vaccination. But the lowest strata are now showing increased polio, probably because they are losing their earlier protection as standards of living and sanitary conditions improve.

There is an analogy with mental disorders, for example, with respect to hospitalized patients. Because of ease or laziness, researchers may analyze hospital data to derive rates of incidence or prevalence, leading to highly misleading findings. For example, psychosis rates on hospital data indicate that lower-class whites and Negroes have inordinately high rates, as F. R. Crawford mentioned in his paper. But in a community such as Baltimore, Md., *total* prevalence rates show that these findings disappear. For example, the Negro-white difference does not hold. Negroes may even have lower rates, but there is probably no difference, given a large enough sample. On findings based on hospital data, we have created an elaborate hypothesis, with respect to sociocultural stress and ethnic group differences, which is probably not valid. Looking at simpler hypotheses we could have come up with more valid explanations for these different rates. For example, we could cite incapacity to care for the sick in adverse social circumstances, or unwillingness of the lower classes to deal with disorganized individuals outside of a custodial setting. This probably is the *entire* reason for findings of differences among Negroes and whites in different socioeconomic strata.

Further discussion on some of the more technical aspects of research led to questions concerning the procuring of good samples, adequate measures, meaningful categories, and comparable results. Marjorie Whiting, National Institute of Neurological Diseases and Blindness, Bethesda, Md., brought up the need for standardization of techniques. An example is the development of a movie demonstrating the technique of taking blood pressure, which is not done in a standard way even by doctors. There are other plans for standardization, but there is resistance to standardization on the part of researchers.

Whiting elaborated on the problem of techniques of measurement and mentioned a conference on methodology in cardiovascular research held at Princeton, N.J., in 1959 that was devoted to the problem of techniques of diagnosis. In some studies, particularly the ones that require data to be collected over a long period of time, the problem arises of the analysis of great masses of data. When we are concerned with the relationship between diet and disease, we are concerned with what the subject ate not only yesterday but possibly over a 60-year period and also with how his diet changed in time. This is a different problem from dietary studies of pregnant women or of two- or three-year-old children. Chronic-disease studies also need long-term follow-up. One such long-term study is that being conducted at Framingham, Mass., of a population of 5000 involving a follow-up physical examination every two years. The researchers are also getting a dietary history. The question arises whether two-year intervals are enough; or should one do it for each year or for each month? Where does one stop? What do you do with all these data? We are measuring things with less and less meaning; using more averages with more homogeneous populations. For example, a study was done on the nutrition of International Ladies Garment Workers Union members, including large numbers of Jews and Italians. No detectable diet differences were found between these groups. We know that their nutritional patterns are different, but the measures and the averages came out the same. Our methods are simply not fine enough. One way of getting around all the variables that seem to be involved has been developed by Jules Hirsh at The Rockefeller Institute, New York, N.Y. He uses fatty-tissue biopses on the basis of which one can tell what people are eating. This may be one of the solutions for which we are looking.

Collection of these great masses of data reflects a sometimes desperate attempt to determine the people who develop chronic diseases. By collecting enough direct data on large numbers of people over long periods we hope that we might get answers within the lifetime of an investigator.

Gladwin referred to the same sort of desperate hope that one has asked the right questions about pregnancy, as in a study being carried out by the National Institute of Neurological Diseases and Blindness, Public Health Service, Bethesda, Md. They are working with 40,000 subjects from the time of their pregnancy until their children reach the age of six, to collect material that may prospectively account for what pathologies develop. Such large-scale projects necessarily involve computing machines. This introduces yet another danger that one might call the "infatuation with computers syndrome." It is insidiously easy to slip into designing research so that one can use a computer, rather then using the machine only as a tool.

Young commented that the larger the design, the weaker the results, in inverse proportion. He pointed out that the need for standardization extended beyond the techniques to the experiments themselves and that the resistance to standardized techniques is observed also at the higher level. He said that a serious weakness of behavioral scientists and a confusion to other students is their disregard for the cumulativeness of science. Each researcher always varies some little piece of the previous researcher's experimental design in the thought that his own is better, rather than trying to add to the previous design. Replication is not considered a contribution. This is perhaps a point of view derived from the discipline of history. Gladwin added that the emphasis in our Ph.D. training also encourages this undesirable aspect of social science efforts.

The problems and the cautions voiced by all the panelists reflect the vast difficulty of conducting research in the broader health questions toward which we are now turning our attention. Clearly, we would not embroil ourselves in these difficulties, and indeed this monograph would not have appeared, were it not that we have been forced to realize that health is a far more complex matter than once we thought. Simple solutions can seldom be found for complex problems.

At the same time it is significant and encouraging that the panelists saw in health research difficulties rather than impossibilities. We can, and we shall, surmount the problems of data collection and data analysis, of communication and collaboration, toward improving the lot of man. At the same time we must hope that no researcher will fail to look beyond his own research task, to envision the uses to which his new knowledge may be put. Our broadened concept of health can raise ethical issues quite as complex as those that face us in the area of research design. Our growth in scientific skill must be matched by a growth in scientific foresight and scientific statesmanship.

DISCUSSION: SOCIOCULTURAL FACTORS IN MENTAL ILLNESS

Mottram P. Torre, *Moderator*
World Federation for Mental Health, New York, N.Y.

Thomas S. Langner, Cornell University Medical College, New York, N.Y., discussed some general findings concerning the relations between socioeconomic status and the prevalence and etiology of mental illness, utilizing data drawn from two epidemiological studies of treated and untreated illness.

In designing such studies, Langner stated, certain theoretical and methodological problems arise that are pertinent here:

Specification of the factors. There are the factors that may cause the illness and factors constituting the illness that must be specified. For example, "anomie" is a broad concept that may be defined in a variety of ways. "Social disorganization," "social integration," and other concepts dealing with component causes of illness also must be specified in some way.

Measurement of the factor. Once a concept such as "social integration" is specified, quantitative indices must be devised that accurately measure its variations.

Relativity of the factors. The research design must take into account that the different variables may not always correlate in the same way. Sociocultural factors intercorrelate differently in varying cultures. For example, the relation of socioeconomic status to religiosity varies in different societies. Therefore, research personnel must not assume that a particular socioeconomic group can always be expected to have the same degree of religiosity in all the societies being studied.

Ambiguity of the factor. Particular events may have different meanings in varying cultures and therefore may have different consequences for mental health. For example, whether the death of the parent is traumatic varies in different societies. Particular experiences are stressful in one context but not in others. Therefore the research design must elicit not only descriptions of certain experiences and events but also the particular cultural meanings of these events.

Confusion of the factor with mental illness. The research design must distinguish whether a particular explanatory variable is really independent of the mental illness it is supposed to explain or is part of the syndrome. Saying that a particular experience contributes to mental illness is a mistake if that experience invariably occurs as part of the particular mental illness in that society. For example, are social isolation or downward mobility independent and antecedent variables that determine mental illness or are they part of the mental illness itself? In research, the time order of the variables must be distinguished; causal inferences are valid only if the explanatory variable occurred before the onset of the mental illness.

Langner then summarized the principal relevant findings of the Midtown and Stirling County studies: persons of low socioeconomic status are more likely to have psychoses and brain damage than persons of higher status; this is manifested in their behavior, such as failure to plan ahead, susceptibility to depression, lack of friendliness and personal trust, greater authoritarianism, acting out problems, and passive dependence. These findings confirm some earlier English research, which indicates that lower socioeconomic group individuals have weak superegos, poor frustration tolerance, strong feelings of inferiority, and tendencies to act out hostilities.

The studies suggest that some causes of these mental conditions in persons of lower socioeconomic status might be discovered in their childhood upbringing and adult life. Some of these causes were defined as: less permissive child-rearing practices than in the upper classes (confirming Urie Bronfenbrenner's earlier finding about social differences in child rearing); fewer demands on the child to succeed in school and to play adult roles in the home, creating a discontinuity with the later demands of adult roles; absence of a prolonged adolescence, as evidenced by such facts as earlier sexual interests; less affection from the parents (confirming Redlich's earlier findings); greater adult stress confronting persons of lower socioeconomic status (greater marital conflict and greater economic problems); fewer friends; lower rates of membership in organizations; lower self-esteem; stigma of manual labor (guilt feeling about lower status in society); withdrawal behavior (belief that life is all "luck" or a "racket"); and reduction of aspiration level, as the result of low achievements in work and in life generally. Contrary to some expectation, there was no evidence that persons of lower socioeconomic status have experienced unusually higher frequencies of childhood stress; for example, they are no more likely to have lost their parents in childhood than persons of higher socioeconomic status.

Alexander Askenasy, World Federation for Mental Health, U. S. Committee, Inc., New York, N.Y., then briefly recapitulated the 10-year Hollingshead and Redlich study, one of the most extensive of those that have attempted to correlate social class with mental illness.

Hollingshead and Redlich developed five working hypotheses, each of which connects the two major concepts of their research, namely mental illness and social class: (1) hypothesis 1 states that *prevalence* of treated mental illness is related to the individual's social class; (2) hypothesis 2 holds that *diagnosis* of mental illness is related to the patient's class; (3) hypothesis 3 claims that *treatment* of mental illness is related to class membership; (4) hypothesis 4 states that social and psychodynamic factors in the *development* of mental illness are related to class membership; and (5) hypothesis 5 claims that development of psychiatric difficulties is related to the *mobility* of the individual in the social class structure.

Among the assumptions implied in these hypotheses are the following: (1) mental illness is defined socially; and (2) class status may be seen as an independent or antecedent variable and diagnosis or psychiatric treatment may be considered as the dependent or consequent variable.

Hollingshead and Redlich found evidence that they believe confirms all five hypotheses. Some of their findings concerning the first hypothesis (dealing with prevalence) were: (1) the lower the class the greater is the proportion of mental patients in the population; and (2) the greatest difference in mental illness exists between classes 4 and 5, class 5 having the largest proportion of patients in the entire community's population.

Neurotic symptoms were found to differ somewhat with social class. Class 1 and 2 neurotics tended to be dissatisfied with the self. Class 3 neurotics showed a tendency to be obsessive or compulsive. Class 4 patients tended toward hysteria and psychosomatic symptoms, while class 5 neurotics tended to be antisocials. Another interesting finding of the study was that upper-class patients may be called "character neurotics," while lower-class patients with very similar symptoms are classified as "chronic schizophrenics."

The authors conclude that there seem to be processes in lower-class living that facilitate the development of psychoses. Hollingshead and Redlich demonstrated that some relationships exist between social class and important aspects of mental illness.

· Seymour Parker, Jefferson Medical College, Philadelphia, Pa., reported that his research group (referred to as the Philadelphia Study) was currently in the process of studying the effects upon mental health of a discrepancy between achievement and aspirations. Much thinking has been devoted to the basic problem of specifying measures and defining research operations. Hollingshead and Redlich had used a coarse measure of social class; subsequent studies have attempted to develop more precise measures. This work reflects the general methodological problem of measuring the variables in mental health research.

Contradictory findings in the correlation of socioeconomic class and mental illness and, in other areas of mental health research, show the need for greater methodological rigor. We are faced with the need to get at the intervening variables and make them part of hypothesis and results. For example, instead of simple correlations between social class and mental health, statements should be framed such as: "social class that is related to particular child-bearing practices correlates with a specific type of mental illness." Intervening variables must be built into the study instead of continuing to carry out research describing crude and broadly stated correlations about social class and mental illness. Similarly, generalizations must be specified according to the context, that is: "migration from X to Y contexts correlates with mental illness."

Problems of research methods arise when different societies are studied. Occupational or economic discrepancies may be large and medically significant in some societies but not in others; discrepancies in the performance of family roles, discrepancies in race relations, and others, vary both in number and consequence. The Philadelphia research team is now exploring some of these areas of life that may present discrepancies by asking the respondents themselves to identify components of success and failure. Hypotheses have been developed about the variation in discrepancies during the individual's life cycle since aspirations may come closer to achievement in later life. A 10-point scale is given to each respondent, who is asked to anchor the highest and lowest points. Then the respondent locates the actual and desired positions of himself and others along the self-anchored scale, both for the present and in the future. The questionnaires also include items to locate significant reference groups and reference values within particular population groups.

A further research problem lies in defining the meaning of failure in various cultural contexts. The members of one society regularly tend to blame personal failure on the machinations of other people or on superhuman forces; the members of another society may tend to blame failures on their personal unworthiness or their personal mistakes. Any crosscultural research must take these differences into account.

Other variables subject to crosscultural differences are achievement values and achievement motivations. Which factors in the early stages of childhood development actually operate to determine motivation toward realization of achievement values? Social groups within one society and in different societies vary more in achievement motives than in achievement values; that is, in different groups people may agree on what they would like to have, but they may differ greatly in whether they really attempt to achieve their aspirations.

H. B. M. Murphy, McGill University, Montreal, Quebec, Canada, raised the general question of how interdisciplinary research could be made more effective, and suggested the following model:

(1) If there previously has not been collaboration in the area, then the first step is probably for each discipline to take some of its own existing concepts and to apply these, without discussion, to a body of shared material. For instance, sociologists could apply standard indices for their concept "social class" to the same population to which psychiatrists were applying a standard classification of their concept "mental illness" without either troubling to understand what the other's concept really implied. From this approach a sort of matrix would be obtained with the "social class" categories along one axis and the "mental disease" categories along the other. Then analysis would be made to see whether there were any greater-than-chance correlations between the two groups of categories.

This is still only the first step but, once it is done, there is little point in repeating it by using other indices.

(2) The next step is to develop hypotheses on the basis of the associations the cross-classification has revealed; here it becomes necessary for the disciplines to meet and attempt to understand each other's concepts in the light of the concrete situation facing them. In the illustration being used, such an hypothesis might be: "the mentally ill drift toward the lowest social class." For this hypothesis to be useful to either discipline, it is necessary that the psychiatrists understand which components of social class are seen by the sociologist as essential to their concept, and the sociologists must clearly understand what the psychiatrist includes in and what he excludes from the term "mental illness." Usually this step means that each discipline must review its own concept as well as try to understand that of the other.

(3) The third step is to devise research operations for testing the new hypothesis unambiguously. If the hypothesis and its testing have both been honest—that is to say, if they are not simply rephrasings or reworkings of already known facts—then the former will usually fail. In any case, the collaboration should not stop there but should go on to the fourth phase.

(4) The two disciplines should investigate jointly, in the light of the success or failure of the hypothesis, what this result means in terms of the validity of the original concepts used. From such an inquiry should come, with luck, a sharpening or clarification of the original ideas, and perhaps even a new concept that is genuinely interdisciplinary. As a result of the inquiry, new or

revised hypotheses should arise, and these in turn should lead to a joint search for a means to test them.

According to this model, Murphy offered an illustration of how an attempt to test an existing hypothesis led to a reconsideration both of the hypothesis and of one of the underlying concepts.

It is known to be broadly true, in the West, that the lower the social class the higher the mental hospitalization rate. When Murphy tried to replicate these findings in Singapore, however, he found marked differences according to ethnic and cultural background. Among the Singapore Chinese, class correlated with mental hospitalization for all ages. Among the Singapore Indians, however, two patterns appeared: (1) with the older age group: the lower the class the higher the hospitalization rate; and (2) with the younger age group, the lower the class the lower the hospitalization rate. Among the Singapore Malaysians, social class did not correlate with mental hospitalization at any age.

To explain these findings it was necessary to examine the components of social class, both in the West and in the Singapore groups. When this was done, self-assessment and the discrepancy between ambition and attainment seemed probably to be the components most closely connected with mental illness in the West, but in Singapore it was recognized that these components did not have the same association with social class. With the Malaysians, occupational aspiration and achievment are not highly valued, so Malays of lower socioeconomic status did not have the sense of defeat or degradation that persons of lower socioeconomic groups have in the West. With the Indians, satisfaction with dominance and dissatisfaction with subservient positions was the main component of self-assessment, with varying results at different age levels in the manual and white-collar groups. In the group of workers, the young, muscular worker gained satisfaction from the status his strength gave him, while the older, weaker man had no compensating advantage from his age and experience. At the white-collar level, however, the youth had to remain under the dominance of the experienced, money-controlling elders, and fretted at this subservience.

From considerations such as these, the broad hypothesis of an association between social class and mental illness can be sharpened, and the original components of a concept viewed in a new light.

Questions for Possible Discussion

Torre called for questions for discussion by smaller working groups. The following suggestions were advanced:

What are the resources available for resolving all the transient disturbances in a society?

What are the differences in psychiatrists' backgrounds, and how do these differences affect patient treatment? How are various pathologies classified and treated?

Identify the association between all possible causal factors and mental illness. How do nonsocial physiological factors affect mental illness? What is meant by the functional theory of mental illness?

Precisely what is meant by mental health, mental illness, and successful personality adjustment, in different societies?

What is the correspondence between verbalized aspirations and achievement effort? Are certain types of behavior defined as deviant in one society (for example, heavy drinking) learned and acceptable behavior in another society? When is such excessive behavior due to frustration in societies that normally legitimize it?

How are the concepts of class and caste applied to rural communities? How do social class and cultural characteristics of mental patients affect their rehabilitation?

What are the problems of extrapolating hospital admission rates to the community in estimating prevalence?

How is aberrant behavior identified in small nonliterate societies?

How are accurate diagnoses made of mental illness in different societies?

How do various ethnic groups react to different mental illnesses and therapeutic programs?

What light can be shed on how world views are formed? How do people learn to discriminate between themselves and the outside social world, and how does this learning affect mental illness? How can we characterize the intersocietal differences in definitions of mental health and in range of mental health or illness; that is, is there a large range of permissible behavior in one society and a narrow one in another?

Under what conditions can prevalence or diagnosed incidence rates be used to answer research questions? Assuming the methodological problems in carrying out prevalence research, how do they affect the utilization of results from such research? How can the genetic approach be used in crosscultural studies when so many variables are involved?

What is the nature of the intervening variables affecting mental illness among children; for example, how does school organization affect the way a child's total life experiences determine his likelihood of becoming mentally ill?

How valuable is the great amount of research in actual care of the mentally ill? How can scholars in different disciplines organize collaborative research?

How are demarcation lines established distinguishing mental illness and mental health? Different cutting points produce greatly different social class correlates of illness.

How do you measure environmental stress objectively without measuring the respondents' subjective opinions about the amount of stress they confront?

The workshop discussions were then centered on the significance of socioeconomic status for mental health research in the future and on clinical problems in research.

Socioeconomic Status

Workshop participants discussed the concept of social class as a historical phenomenon. Class membership had legal status implying certain privileges or the absence of these privileges. Once the legal status of a class was withdrawn (as for instance in France during the 1779 Revolution), it persisted as a tradition, for example, for the choice of an occupation and above all in the "class consciousness" of its members. The word itself was derived from European usage, particularly from Marxism, and so bears ideological implications. Both the empirical meanings and ideological implications are inappropriate to the United States and many other non-European societies. At the time of Sigmund Freud's research, distinct class stratification existed in Europe, with each class having its own distinctive way of life and its own distinctive health conditions. The differences in theoretical generalization between Freud and Alfred Adler were due in part to the fact that they recruited their patients from different social classes.

A bothersome feature of social class literature is that often it is not clear whether all people in a class are supposed to behave similarly or whether the supposedly typical class behavior is simply a central statistical tendency. Some analysts of class behavior assume that a class is not just a theoretical construct built from a multidimensional set of indicators but believe instead that classes behave distinctively and are aware of their own existence.

The concept of social class is more relevant in some studies and in some social situations than it is in others. In some populations, ranking by prestige variables or caste variables other than socioeconomic status is particularly important. It must be remembered that although class may not be an appropriate classification of people in the United States, it should not be omitted in research in those societies where distinct class stratification exists. Class is an important determinant and correlate of mental health in *certain* societies. The problem is, perhaps, to develop a substitute for the concept of "class" that is psychologically meaningful to persons. For example, the variable of "occupations" alone represents a psychologically meaningful classification of people that correlates with mental health. Social scientists now are developing less encompassing and less ambiguous terms, such as "occupational situs."

It is also important that single explanatory variables, such as "class," should not be used to build all-encompassing explanations. It is the individual's total life situation that determines what illness he will contract, where he will go for treatment, and how he will be treated. It is generally agreed that the patient's entire life history affects his current mental health, and therefore measurement of socioeconomic status or any other social characteristic at a single point in time is insufficient. Various measures of social status at different times in the respondent's childhood, the respondent's current socioeconomic status, and other measures, must be adopted.

Two-variable relationships must be specified by introducing a third variable. An intervening or explanatory variable might show that the original pair of variables are really involved in a covariation attributable to some more basic factor. The concept of class is an excessively simple and often not useful variable. Simple two-variable correlations between class and mental illness are often spurious, contradictory, and full of other defects. Consequently intervening and explanatory variables must be located. Of course, when such terms as "class" are used, the researcher must clarify exactly what the concept means in the particular instance.

Another ambiguity lies in the question of whether a concept of human worth is included in the particular study. Such a concept of worth can become a central variable explaining the relationship between class and mental health. The individual's self-judgment about his worth and the discrepancy between his perception and the social perception may be crucial ways in which class membership determines mental illness. The best concept is the one most powerful in predicting human behavior, and the concept of a class is a static structural attribute, a convenient way to classify persons at a single point in time. However, in practice a social system is fluid with specific individuals moving up and down. Persons are always aware of whether others are equal to, above, or below them in social ranking. Invidious distinctions are made by many individuals who come to psychiatrists with mental health problems.

The discussion then turned to the second part of the relationship: the meaning of mental illness in the class-illness relationship. Again, the problem was imputed to be one of theoretical specification. Symptoms such as "social isolation," "impaired relationships with step-parents," or "broken home" have different causal implications in various social classes.

Perhaps the concept of "mental health" is so vague and broad that it should not be used at all or must be specified before it can be meaningfully utilized. A problem of defining mental illness does arise if the project's research problem is to estimate total prevalence of illness in a society. Actually, a unitary dimension such as "illness-health" is difficult to use in any survey of prevalence or diagnosed incidence. In such studies, it may be best to use a great number of specific diagnostic categories. This will produce a more complete reporting of all types of mentally ill conditions in the population.

One research decision must be the level of specificity or the stage of illness. One approach is a symptoms checklist, such as the Cornell list, that can be used to identify various levels of mental disturbance from the very mild to the most severe. Another practical problem, when research deals with diagnosed incidence of disease, is that people come to clinics with different degrees of illness; for example, when male patients finally come to a clinic, their conditions are more severe than those of the new female patients. For certain purposes, such as public health prevalence studies, it is necessary to get specific data to find certain symptoms in the population, that is, definition of a "case" or "illness," before the patient gets to a clinic and before he is officially diagnosed.

It is probably a serious mistake to define a "case" or "illness" according to the therapeutic policies of the community. That a person is living in the community without treatment or that he happens to be under treatment are not sufficiently accurate distinctions between the healthy and the ill. The problem is whether the individual is functioning in the community according to the demands of his social status. In practice, of course, there are a great variety of role demands upon people: some statuses demand much and some demand little. In different societies, the severity of role demands are different; that which constitutes successful functioning in a particular status in one society may not be the same in another society. A defect in the use of treatment as an indicator of illness is the fact that every community has its own structure of therapy and differing therapeutic facilities. Consequently, estimating prevalence of mental illness by the number of patients treated is very misleading.

To estimate illness prevalence on the basis of treatment statistics, it must be established that there are no group biases in the provision of therapy. Using treatment statistics is also misleading because there are so many "repeaters" who go from one therapist or hospital to others. Total treatment statistics do not estimate the number of *individuals* under treatment. Many communities have no mental treatment facilities and therefore have no treatment statistics from which prevalence might be estimated.

The definition of mental illness and prevalence statistics should include the neuroses as well as the psychoses, but mental illness definitions based on "successful functioning" must be carefully worked out because successful functioning in an unsuccessful social group may not produce any identifiable symptoms. On the other hand, moderate functioning in a socially approved situation (such as a person living alone and working) may be associated with certain stresses, tensions, and social abnormalities (in this case social isolation).

In crosscultural research, role adequacy is again considered as a definition of mental health. Social integration, adjustment, and reality orientation may be identified as essential dimensions of mental health or illness. Certain optima for each of these dimensions would make for mental health. On the other hand, maxima and minima (such as too much integration or too little integration) would involve both social strains and personal tensions.

Summary

A general summary of research problems was provided by Bertram Schaffner, William Alanson White Psychoanalytic Society, New York, N.Y. The topic of his résumé was "The Mental Health of Ignorance." Psychiatrists face the problem of acting in an area where they are unsure and where they do not fully agree on their concepts. Therefore psychiatrists must have considerable confidence in their own judgment, high learning capacity, adaptability, and humility about their own ignorance.

Sociologists and anthropologists approach the field with methods and viewpoints different from the psychiatrist's. One basic question is whether psychiatric research about society, culture, and mental health can be developed in a scientific way. Some persons question whether psychiatry at present conceptualizes and solves its problems or organizes its data in a scientific way. More important, psychiatric research about different societies has not yet developed to a large extent. One area of ignorance is the number and kinds of variables affecting mental health. Some persons call for one key explanatory variable: the "cause," such as "class." Probably in the future psychiatry will employ multivariate explanations; that is, aside from class and religion, family structures and other factors will have to be studied, appropriate data gathered about them, and multivariate explanations of mental illness developed.

The lack of clarity of the psychiatric vocabulary is a serious research and therapeutic problem. Sociological research has made the mistake of accepting too willingly some of the concepts in contemporary psychiatry when these concepts are poorly defined. Such concepts as "stress," "tolerance of stress," and "tolerance of pain" must be specified more clearly. It is possible that psychiatrists are confusing stress or tolerance in one area with stress or tolerance in another area; for example, after developing ideas about stress from pain and tolerance of pain, it is possible that psychiatrists then extend these empirical generalizations into their thinking about social stress and tolerance of social stress. Consequently the concept of "stress" must be specified, and measures of stress must be developed. Furthermore psychiatrists have not been sufficiently specific about other concepts such as "uncertainty," "fear," and reaction to uncertainty and fear.

There are a number of important research problems that the panel has not discussed. For example, an interesting research problem in many societies is the effect of the entire household structure (not just the nuclear family) upon mental health, for in these societies the nuclear family is imbedded in a larger household. Another important but unmentioned topic is "anxiety." How do social and cultural factors lead to greater anxiety in the individual? Parker's study of discrepancies is a good investigation along these lines: presumably the discrepancy between achievement and aspirations should contribute to anxiety provided that other contributing conditions exist. Research on anxiety should take into account the fact that people are unequal in their normal level of anxiety and in their tolerance of anxiety.

Research should be initiated to examine the meanings of events as related to persons. The discussion here concerned causal factors, but the individual's personal definition of events will determine his mental reaction to them. There is a need to develop social research methods for eliciting such definitions of situation.

If social research concerning mental health must deal with many variables among causes and consequences, obviously new research technology must be used Possibly computers will be used to interrelate the great number of pertinent variables among the causes and consequences of mental illness and mental health.

DISCUSSION: SOCIOCULTURAL FACTORS IN CHRONIC ORGANIC DISEASE

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The emergence of chronic organic diseases as a dominant feature of the illness pattern in the populations of the more highly industrialized areas has necessitated new approaches for the investigation of the causation of disease. The features of chronicity, multiple causation, long subclinical latent periods, and the interrelationship of genetic and environmental factors require complex approaches aimed at their solution. Among the present problems in the study of sociocultural factors and chronic organic disease are: (1) the necessity for the development of new criteria for the determination of proof of causation in chronic disease states; (2) the availability of suitable population groups for long-term epidemiological studies; and (3) appropriate techniques to alter the cultural habits of people to alleviate or prevent disease.

Causation of Chronic Disease

The recent experience in the studies that have related the cigarette-smoking habit to the development of certain histologic forms of lung cancer has raised the fundamental question as to how much proof is needed before one can accept a causative relationship between an environmental habit and a disease. Since most of the chronic diseases have multiple causation, Koch's postulates cannot apply in these situations. Based on epidemiologic, clinical, and experimental experience with regard to cigarette smoking and cancer of the lung, Ernest Wynder, Sloan-Kettering Institute for Cancer Research, New York, N.Y., has promulgated four postulates that may be utilized as criteria to determine whether a specific environmental factor may be a causative agent in a specific disease. These postulates may be expressed as follows:

(1) The greater the exposure to the factor, the greater the risk of the population involved.

(2) The removal or reduction of the factor must be followed by a reduction in the incidence of the disease.

(3) Epidemiological pattern, including time trends, geographic distribution, sex ratio and socioeconomic distribution, should be consistent with the distribution of the factor.

(4) Experimentally the factor should produce similar pathology in a laboratory animal.

It was stated that all evidence to date clearly implicates cigarette smoking as a causative factor in certain forms of lung cancer, since all four criteria are fulfilled.

Discussion relative to these postulates centered mainly around the second point, in which the reduction of a factor should be followed by the reduction of the incidence of the disease. It was stressed that the mechanical application of this criteria without due regard to the over-all picture might lead to serious error in the interpretation of the relative role of various environmental factors.

Utilization of Various Population Groups

The search for population groups to serve as human laboratories that might reproduce certain controlled situations in experimental laboratories is of basic importance in the study of chronic organic disease. For instance, certain sects that eat only vegetables, certain religious orders that do not permit smoking, and other groups that prohibit consumption of alcoholic beverages lend themselves to certain types of studies. Such difficulties as the stability and cooperation of such population groups require various specialized approaches. Relative to this, Warren Winkelstein, Chronic Disease Research Institute, Buffalo, N.Y., suggested that there may be some overemphasis on the importance of studying "primitive" cultures and that perhaps insufficient attention has been given to the study of some problems in our own society. He further stated that despite the fact that this conference had emphasized sociocultural factors, relatively little has been said about studies of families and households as special units. At the Chronic Disease Research Institute, Winkelstein has been interested in the study of the aggregation of disease in households, since this has been a fruitful area for learning about the ecology of infectious illnesses. It has long been recognized that hypertension occurs more frequently in the families of patients with this disease than in the general population. In reviewing previous studies bearing on the general question of familial aggregation, he noted that only a few have taken advantage of the fact that households generally contained two distinct populations: (1) those persons related by blood to the propositus and (2) those without this relationship. If the incidence of hypertension in the family of a hypertensive were limited to blood relatives, a genetic causal hypothesis would be supported. However, if the incidence of hypertension included nonblood relatives living in the household, an environmental hypothesis would be indicated.

To test the hypothesis that the household aggregation of high blood pressure included all members of the household regardless of blood kinship, outpatients from a large county general hospital with diagnoses of essential hypertension were selected for study. Then a comparable group of outpatients from the same hospital without hypertension, matched by age, sex, and race were selected as controls. The households of these index cases as well as the households of their first-degree relatives were then studied. FIGURE 1 shows the number of relatives and other unrelated persons in the households of patients and controls and the households of their first-degree relatives. FIGURE 2 shows the mean blood pressures for each of these groups. It is evident that the mean blood pressures are higher in the first-degree relatives of essential hypertensive patients than in the first-degree relatives of controls. The mean blood pressures of unrelated persons in the households of hypertensives and their first degree relatives are also higher than the blood pressures of comparable control groups. Thus it is suggested that the household aggregation of blood pressure is not limited to blood relatives; it extends to all those living in the household of the affected individual. This finding supports an environmental causal hypothesis.

These preliminary data emphasize that the household is an important social aggregate useful for chronic disease study. Despite the great changes that have taken place in our urban culture, the household remains in many ways the most important unit in this culture. It would therefore seem a logical place to search for clues to the causes and mechanisms of disease production.

Many primitive cultures are in reality not so simple and are perhaps much more complex than our own society. However, in studying the diets of people it was considered advisable wherever possible to study isolated, homogeneous, and specialized population groups for the reason that, in general, North American diets are often confusing and significant differences do not exist among the various segments of our population. Furthermore, at present emphasis should be placed upon investigation of the quality of the diet and specific elements in it, rather than with the over-all nutrient value, where the concern has been in the past. In the United States the question is no longer one of poor nutrition but one in which there may be an imbalance in the relationship of the various dietary elements to each other. It was recognized that the collection of reliable dietary data is difficult. It was suggested that in order to determine how the various eating patterns have originated it may be necessary to study in detail the dietary habits of different members of families of households.

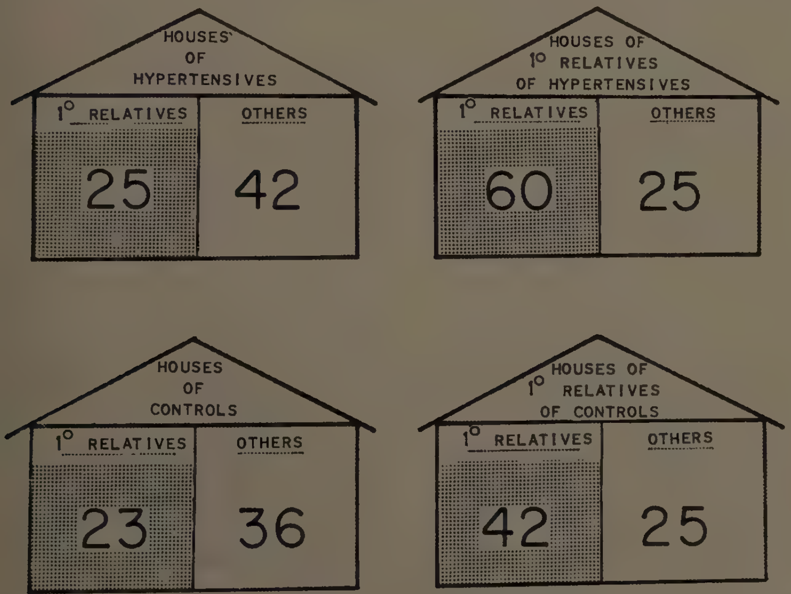

FIGURE 1. Numbers of individuals studied in the households of hypertensive patients controls, and their first-degree relatives.

Walter B. Quisenberry, Hawaii Department of Health, Honolulu, Hawaii, emphasized that Hawaii presents a fertile area for epidemiologic study of chronic organic disease because it is a multiracial and multicultural community. He also pointed out that this population was relatively stable in comparison to many other regions. This creates a favorable climate for long-range studies. His figures indicated that in Hawaii the Japanese women had an incidence of carcinoma of the breast that was three times higher than the Japanese women in Japan. There may be an association with differences in nursing habits. Studies are also under way in Hawaii concerning the relationship of the pattern of love-making and sex behavior to such questions as the incidence of carcinoma of the prostate, since this form of cancer is significantly less frequent among Japanese Hawaiians than Caucasian Hawaiians. It was noted that the patterns of love-making among the Japanese are changing in the younger generation. The need for studying these changing cultural patterns in order to determine the part they might play in the causation of certain forms of cancer was discussed.

It was emphasized that one must be cautious in evaluating local trends in the incidence of cancer because these may merely be reflections of over-all global changes. It has been shown in recent years that cancer of the stomach appears to be decreasing over the entire earth.

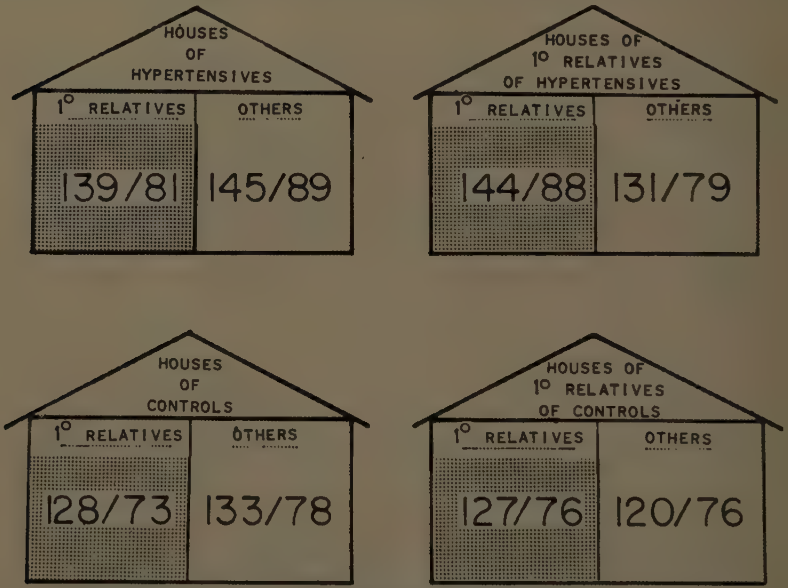

FIGURE 2. Mean blood pressures for each of the groups under study.

In studying population groups in the less developed areas, recognition must be accorded to possible limitations in the validity of the data. Death certifications may be less reliable, diagnostic procedures, skills, and criteria as well as hospitalization habits may differ radically in various areas and in reports for various ethnic and racial groups. These artifacts may create significant differences in the morbidity and mortality data.

Ability to Influence the Habits of People

As has been indicated, cultural patterns such as diet, cigarette smoking, and modes of transportation may to varying extents influence the development of certain clinical organic diseases. It therefore becomes important to determine the extent to which such habits may be altered in population groups. Experience has recently been obtained with attempts to encourage people to attend cancer-detection clinics on an annual basis for the purpose of early cancer detection. Emerson Day, Memorial Center for Cancer and Allied Diseases, New York, N.Y., who directs the Strang Cancer Prevention Clinic, also in New York, the largest clinic of its kind, noted that despite much effort only a small fraction of the population attends cancer-detection clinics on an annual basis. He also noted that the groups that do attend these clinics are not representative of the population as a whole in that these groups generally consist of a majority of individuals whose ethnic origins are Eastern European. It was also noted that a relatively disproportionate number of people who attend these clinics come from suburban areas and represent higher socioeconomic levels. In the Framingham, Mass., study on heart disease only 70 per cent of the population cooperated in spite of an intensive educational and preparative campaign. However, throughout the course of several years most of the individuals have remained with the study.

The experience with regard to altering cigarette-smoking habits of the population in this country has indicated that if there is to be any success, the approach must be a total one. So far there has been very little success in this direction. In Sweden, where an intensive approach to this problem was undertaken in one study, it was possible to affect the smoking habits of 95 per cent of the individuals in the group, for the first year. However, after one year this had dropped to 50 per cent. Recent and current studies in Oregon with high-school teenagers in a program designed to influence their smoking habits has not yet yielded definitive results. It was also pointed out that for various reasons the medical profession has not totally accepted its responsibility in this problem. The question as to how far health agencies can go in officially acting on this problem resulted in divided opinions with some favoring compulsion and others opposed to any official action. It was also indicated that departments of health usually do not take action unless the contemplated course is desired by the populace at large. It was generally agreed that in order to alter daily habits of individuals, campaigns were needed comparable in magnitude to those utilized by the advertising agencies in the commercial world.

DISCUSSION: SOCIOCULTURAL FACTORS IN FERTILITY

Marshall C. Balfour, *Moderator*
Kathleen Shafer, *Rapporteur*
The Population Council, New York, N.Y.

The panel discussion centered around four classes of sociocultural factors in fertility: (1) social institutions and cultural factors; marriage, kinship systems, and specific beliefs and customs; (2) economic; (3) educational; and (4) health. Each panelist dealt principally with his particular field of competence, but no attempt was made to separate these interacting factors rigorously.

Frederick Osborn, The Population Council, Inc., New York, N.Y., who described himself as a nonprofessional long-time student of anthropology and eugenics, opened the discussion at the invitation of the chairman, Marshall Balfour. Osborn presented an apt introduction to the subject, emphasizing its timeliness. There is not one population problem but rather a multitude of different problems peculiar to each country as it undergoes the demographic transition from traditional high birth and death rates to decreases in both, with death rates decreasing much more rapidly than birth rates. The United States moved through this period under favorable circumstances; with an abundance of land and rapid technological advances, the country was able to absorb a sevenfold population increase while the rest of the world increased only threefold. Our population problems concern quality more than quantity, although quantity is important in the overcrowding and deterioration of our cities and in the inadequacy of educational facilities for handling our growing numbers. In some countries, such as Australia and Canada, a larger population would be an advantage. In the underdeveloped countries, death rates have fallen as much in a few decades as they did in Europe and the United States during 150 years. At present rates of increase, doubling occurs in 20 to 25 years. Technological advances in production cannot keep up with such a rate of increase, and the densely populated underdeveloped countries cannot absorb such an increase with traditional methods of production. Some sort of control of fertility is indicated. In the United States decisions on the number of children are regarded as the prerogative of parents, but are largely determined by the social and psychological pressures of the parents' environment. In Asian countries government responsibility is accepted, and population control is a part of public policy. The United States is more backward in this respect than many of the underdeveloped countries. In all countries, however, wise and effective control is handicapped by lack of knowledge of the factors that influence natality.

The terms *fecundity* and *fertility* are used in a special sense by demographers in the United States to refer to reproductive capacity and reproductive performance respectively. This distinction is contrary to general usage, and Osborn recommended that confusion be avoided by replacing *fertility* with *natality* to refer to reproductive performance, which is in agreement with European practice.

Social Institutions and Cultural Factors

William J. Gibbons, Fordham University, New York, N.Y., began by remarking that the terms marriage and family are understood differently from culture to culture, and that this affects comparative data and analysis. In the United States, where marriage means a legal contract and establishment of a nuclear family, practice has changed with time. Median age at first marriage has always tended to be lower than in Europe and recently has declined sharply to 22.7 years for men and 20.2 years for women. Regulatory practices have spread at the same time, minimizing the effect of early marriage. The tendency is to have children at an early age and to achieve completed families early. In Ireland, on the other hand (and to some degree in Italy and Japan), marriage is deferred. This has its bad side psychologically, but too-early marriage also is bad. Where there is no conscious spacing of children, average size of completed families may still be large, even with late marriage.

Deferring marriage beyond the "period of maximum fecundity" would reduce fertility, but there was no agreement among the panelists that there was such an age. Although fertility tends to be higher among young women, this may be related to an increase in the proportion of sterile women at higher ages rather than to a decrease in fecundity.

Concerning the percentage of the population marrying, Gibbons pointed out that Catholic tradition since St. Paul and St. Augustine had reservations about marriage. Other things being equal, virginity and celibacy were given positive value for those willingly embracing them. Pronatalist doctrines became common with the Protestant Reformation. Luther, for example, believed that everyone to be virtuous should marry—boys by 18 or 20 and girls from 15 to 18—and the number of children should be left to God. Population increase was held to be a good thing in itself, as mercantilist doctrine shows, and this is an inheritance hard to change. Catholic theological emphasis is on personal responsibility, with high value placed on welfare and the education of children, which acts as a restraint upon fertility when norms are maintained.

A footnote on the influence of religious beliefs on fertility was introduced later by others with the observation that Ramadan, the Moslim period of abstinence, was not reflected periodically in Moslim birth rates.

Mating patterns in the West Indies were described by George W. Roberts, Federation of the West Indies, Port of Spain, Trinidad, West Indies. By applying the two criteria of legal sanction and the sharing of a common household by the couple, three types of unions were recognized: (1) married, (2) common-law, and (3) visiting. Formal marriage is less prevalent than in European populations and increases with age. Matings among the young are mostly of the visiting type. At age 45 the mating pattern is: 50 per cent married, 25 per cent common-law, 25 per cent visiting. Visiting unions produce fewer children: 2.3 per union, compared with 3.9 for married unions and 4 for common-law unions. If the rate of marriage should increase, an increase in fertility could be expected.

G. William Skinner, East Asia Institute, Columbia University, New York, N.Y., dealt with the complex of profertility factors that become incorporated in kin groups, with special reference to kinship systems in rural Southeast China. In general, members of any corporative group (that is, a group capable of existing longer than its individual members) have a compelling interest in the continuation of the system and the maximization of its power, inasmuch as their security and prestige are rooted in it. Where members are recruited largely through reproduction, corporative social systems—whether nations in a competitive international situation, tribes in a competitive area, or kin groups in a competitive society—tend to be biased in favor of high fertility.

In the Chinese kinship system the bias is reinforced in several ways. The fine arts and literature abound in exhortations to high fertility. Brides were without status until they produced children, and barren women were regarded with contempt. Without progeny, a person would not be cared for properly in his old age or after death in the next world. The preference for one sex (for males in a patrilinear kinship system) necessitates large families in order to get the requisite number of children of the preferred sex. This sex preference is also linked to early marriage since in a patrilocal system such as this there is an economic motive in marrying off the disfavored sex as early as possible. Eagerness for progeny also encouraged early marriage, which was arranged by the corporate families concerned and was practically universal. Marriage was not delayed by a period of courtship, and the young couple did not have to fend for themselves economically. The cost of excessive fertility was distributed within the kin group. This charity function of the clan organization affected not only fertility but child survival as well.

Specific beliefs and customs in all societies have effects not only toward high fertility but often against it. The strong prohibition against marriage of widows that exists in several large and corporative Asian societies prevents significant numbers of women from having children. The tabu on intercourse during lactation or for some period following childbirth tends to act as a brake on fertility, but its effect on net reproduction is canceled by the better chance for survival thus given the child already born. On the other hand, tabus on intercourse during menstruation would tend to favor fertility by concentrating intercourse in the woman's most fertile days.

The effect of plural marriage was discussed. Moslem fertility in Asia and in the West Indies tends to be higher than that of non-Moslems. No agreement was reached that this is related to polygamy. As one participant remarked, polygamy is practiced only by the wealthy whether they are Moslems or Americans. Thus the number of polygamous families is small. (Reference was made here to the positive effects of wealth on survival rates and to the effect, if any, of a high-protein diet on fertility.) It was pointed out that if all women are mated, polygamy would have no effect. Polyandry, however, is used as a device to lower fertility in the Punjab, so that land does not need to be divided. Brothers share one wife, thus restricting two or three men to one woman. An uneven sex ratio facilitates this practice.

An Indian participant remarked that fertility is low among tribal people in India, but their methods of control are unknown. Perhaps the low fertility of some isolated peoples is achieved by intention, and they may have methods that have not been investigated. Discussants speculated that this may be related to tabus on intercourse during lactation. On the other hand, investigations by I. Polunin in Borneo and S. M. Lambert in the Pacific, found that the effective controls there were disease and mortality. Apparent low fertility may simply be due to failure of memory: without records made at the time, the memory of number of deceased children and of abortions in the past is likely to be at fault.

Economic Factors

Discussion was introduced with statements by W. Lissner and G. Ohlin.

WILL LISSNER (*American Journal of Economics and Sociology, New York, N.Y.*): There is a wealth of statistical material available for the developed countries but, to quote N. B. Ryder:[1] "The problems and potentialities of differential fertility analysis seem to be more impressive than the results to date."

There is clear evidence of an association between crude birth rates and total business activity, but the nature of the relation is obscure. Although Dorothy S. Thomas's[2] classic investigation (1927) employed an approach to business-cycle analysis that is now obsolete, many of her observations and conclusions still stand, supported empirically by the depression and the postwar baby boom. Thomas considered the response of the birth rate to fluctuations in total business activity to be probably partly direct, through differential conscious control of births in prosperity and depression, and partly indirect, through fluctuations in the marriage rate. She also noted an inverse relation between the illegitimate birth rate and business activity.

Repeated investigations have shown that fertility has tended to vary inversely with income in complex ways that indicate that income is an economic factor with social referents becoming merged with it; it is in this merged form that income exercises its influence upon fertility. Understanding of the process might be obtained by going behind the association to discover the ways that changes in family income and national product affect marriage plans, family formation decisions, and the chance occurrences that, among other things, contract and expand legitimate birth rates while expanding and contracting the rates of illegitimate births. More meaningful measures of income are needed for comparison with fertility than now appear on census questionnaires and schedules. Using the new techniques of attitude and motivation research, it is necessary to go behind statistical aggregates to discover how and why individuals respond to combinations of economic and sociological forces. The problem calls for interdisciplinary cooperation before the first steps can be taken toward an integrated social science.

GORAN OHLIN (*Columbia University, New York, N.Y.*): In no society does reproductive performance reach the limits imposed by biological fecundity. Some sort of social control intervenes, and this control is ultimately economic. Economic considerations underlie the adoption of institutions by cultures and the decisions of individuals. For example, age at marriage, which has a large and direct effect on fertility, has tended to be high in Europe, where marriage was linked to the availability of land and the ability to support a family. In countries where industrialization is only beginning, small landowners are being transformed into workers who reach their maximum earning power early in life and have no reason to postpone marriage. In general, fertility is high when there are strong economic incentives to promote high fertility, or at least where economic incentives do not strongly favor low fertility. Children compete with a standard of living, and the decline in fertility in industrialized Western society is linked to the inculcation of expanding consumer tastes. The present revival in fertility may well be the result of productivity and incomes having caught up with people's ideas of the consumption that the good life demands.

In the underdeveloped countries large families are often economically meaningful, providing labor and social security for parents. The communal aspect of life lightens the burden of large families, so that their private cost is small. The state pays for such factors as education, health, and sanitation, and the high social cost of children is not considered in the reckoning of the people who have them. If something is provided at a price below its cost, society will probably demand more of it than it ought. In addition, there is little mobility and few alternatives for meaningful choice. The future course of fertility in the underdeveloped countries depends upon the opportunity of individuals to make meaningful choices between many children or a better life for themselves.

Gibbons objected that factors other than economic are operative in choice. There is the matter of ethical or cultural norms. Very relevant also are such matters as the availability of means and technical knowledge about contraception, and attitudes about the social relationship of the family and the individual in society.

Skinner said that in southeast China there is a very sharp positive correlation between family size and status, especially in rural populations. This is the reverse of most Western experience. It was agreed that as land ownership increases the size of family rises as well. Children give prestige, and children and wives provide a supply of labor.

Studies on the influence of land ownership and mobility on fertility are deficient. If children are an economic asset, then by how much? The belief that they are an economic asset may not be justified by the figures. Large land holdings imply better education, which in turn implies better records, while data about low-income groups are less reliable. According to Lissner, the United States has such a variety of land-use conditions that any part of the world can be matched within its borders, and data on depressed areas in the United States might throw light on some questions relating to underdeveloped countries.

The impact of industrialization in Puerto Rico on cultural patterns related to fertility was described by José Janer, Puerto Rico Department of Health, San Juan, Puerto Rico. Since 1940 industry has replaced agriculture as the greatest source of net income. Puerto Rico has no other natural resources, and the light industries developed are best adapted to female employment. Women comprise two thirds of the labor force. No facilities are provided for the care of children; with women the principal breadwinners, the men perforce stay home to care for the children. Women thus become interested in controlling fertility, the preferred method being sterilization. The creation of attractive jobs has resulted in more people joining the labor force, and unemployment has increased in spite of industrialization and migration. More men than women are leaving Puerto Rico. The ratio of females to males is becoming very large and is a limiting factor in fertility. Since 1940 there has been no apparent change in male fertility, but there has been a significant change in female fertility, which can most probably be accounted for in large part by the sex ratio in fertile age groups.

The course of fertility control in Puerto Rico is no model for Asia, because Puerto Rico has the two great advantages of migration and industrialization to accelerate the process.

Education

It was agreed that it is important to know what education is before it can be related to fertility rates. People who have been taught to read and write may be functional illiterates if this ability does not influence their behavior and attitudes. On the other hand, some highly educated people may be unable to read and write. Most of the data on the relation of education to fertility comes from census schedules, which are not designed to measure the effect of education as such. An inverse statistical relation appears between years of schooling and fertility because formal education is an index of other things—social class and economic status—and not because there is a direct relation. In the West Indies, Roberts stated, one, two, or three years of school had no more effect on fertility levels than no schooling at all. Only after about six years of schooling did an effect appear.

There was disagreement about the importance of literacy in action programs aimed at decreasing fertility. It was pointed out that in dealing with millions, reading and writing are essential. Others held that word of mouth and audiovisual means of communication are sufficient. The success of UNESCO's fundamental education projects was cited as evidence. The chairman pointed out that certain kinds of skills were taught in the UNESCO projects, but it has not yet been proved that these means can influence an illiterate population with respect to family planning. Gibbons remarked that even if the illiterate population could read, communication would not be assured unless semantic obstacles were overcome and we understood their system of values.

One participant with experience in educational programs aimed at fertility control held that literacy is an important factor in setting up lines of communication but that audiovisual media are also useful. Change is not a unit act but a process, and a person adopting new practices moves through three stages: interest, knowledge, and action. The first two stages are best facilitated by impersonal external sources. People must be provided with a vocabulary to deal with family planning, and they must be able to discuss it before action can be effective. Efforts must not be confined to one medium or approach, but all available media and approaches must be combined.

Health

Janer described health improvements in Puerto Rico during the past 20 years. The drop in mortality while fertility remains high is an example of what is happening, albeit more slowly, in other parts of the world, including Asia and South America.

In 1940 life expectancy at birth in Puerto Rico was about 46 years; it is now about 68 years. Apparently the beginning of this sharp drop was the result of improved socioeconomic conditions related to World War II rather than of health measures. The drop was then accelerated by improved medical and health measures, such as the use of sulfa drugs, insecticides, and antibiotics. The tuberculosis death rate was halved in one year, and since 1952 not a single death has been attributed to malaria. Presumably incidence of disease also dropped although morbidity is less easily measured. Before the spread of health improvements in Puerto Rico, high fertility contributed to high mortality. Female survival rates were lower than male rates during the reproductive age span, but they are now higher through the entire life span.

There has been little apparent change in fertility from 1900 to 1950. The gross reproduction rate was quite constant up to 1950, but the net reproduction rate has been gradually increasing according to changing mortality patterns. Net reproduction rate in 1940 was 1.67; it is now over 2. Under present conditions of mortality and fertility, the population of Puerto Rico could double itself in a single generation.

These resoundingly successful health programs with their existing facilities in different countries represent an existing organization to which family planning programs may be attached. Sanction by attachment to health movements is important, but a program built entirely on clinics and working only through selected health workers would not have access to large segments of the population. The family-planning program must be extended far beyond the health field to make it available to those who would not normally be reached.

One of the panelists emphasized that projections of recent health trends may not be reliable bases for predictions. The question was raised as to whether it is possible to evaluate the extent to which disease may increase in the future.

Conclusion

There was a consensus as to the importance of sociocultural factors in fertility. It was accepted that where high fertility continues in the face of a marked decrease in mortality, the resulting population growth often exceeds the resources that are available to raise levels of living. Marriage rates and mating patterns, as well as social customs and reproductive practices, often contribute to high fertility but sometimes to a reduction in births.

The economic factor was recognized as a primary force of the sociocultural complex that influences reproductive performance, although the mode of action is by no means clear. At some point factors of social control intervene. For example, in the transition from agricultural to industrialized societies, attitudes on the size of family change in the direction of purposeful steps leading to fewer births.

Concerning the educational factor: there was some disagreement about its effect on natality. Whether formal education is a direct or indirect factor was debated. Those familiar with the underdeveloped areas maintained that literacy is an essential aid in the field of communications but that a minimum level must be achieved before an effect on reproductive behavior is observed.

Regarding health: Puerto Rico was frequently cited as an area where health improvements have dramatically reduced mortality. Only recently has a change in fertility occurred, associated with the exceptional conditions of migration and industrialization.

If one unanimous conclusion emerged, it was that more study is needed before the effects of sociocultural factors on fertility can be defined in measurable terms.

References

1. RYDER, N. B. 1959. Fertility. The study of population: an inventory and appraisal. P. M. Hauser & O. D. Duncan, Eds. Univ. Chicago Press. Chicago, Ill. : 400–436.
2. THOMAS, D. S. 1925. Social Aspects of Business Cycles. Routledge. London, England.

DISCUSSION: SOCIOCULTURAL FACTORS IN PUBLIC HEALTH

Edward Wellin, *Moderator*
American Public Health Association, New York, N.Y.

Edward Wellin: For purposes of discussion, let us consider that the general topic, "Sociocultural Factors in Public Health," is constituted of four interrelated areas:

(1) *Disease (or social pathology with health implications)*. The emphasis here is on the interrelationship of sociocultural variables with the ecology and epidemiology of disease or health-related problems.

(2) *Behavior and belief.* This has generally to do with social, psychological, and/or cultural responses to disease and to programs or activities designed to control illness and promote health.

(3) *Means, agencies, personnel.* This involves the institutional patterns, social structures, professional subcultures, and organizations of various types developed by society for the prevention, control, and management of illness and the promotion of health.

(4) *Collaboration between public health and the social sciences.* This is a residual area, having to do with intra- and interdisciplinary issues involved in collaboration between the public health and social science fields.

We have an excellent group of panelists, each of whom has the choice of talking about studies or problems within his own purview, discussing previous conference papers or commenting critically on some part of the broad area of social science and public health. There will be ample opportunity for general discussion.

Lloyd Braithwaite (*University College of the West Indies, Mona, Jamaica, West Indies*): First I shall make a few general observations. Frequently, when anthropologists speak of culture, they use a model of culture derived from the level of the tribe or village. This is quite adequate for many purposes. However, in public health—particularly in reference to some of the poorer areas of the world—one needs to operate on a *nation-state* level. Anthropologists must begin to realize this and to develop approaches appropriate to the study of *national cultures*. For instance, in Ghana, although tribes are important, there has been a surge of nationalism. Can cultural processes in Ghana be understood if one's model is the relatively homogeneous and isolated tribe? Certainly not.

Another point is that the standards of the more developed and richer countries are frequently projected onto the rest of the world. What may be feasible for the United Kingdom or the United States may be economically and culturally impossible for the West Indies. We tend to think that our public health goals are reasonable in all countries, but this is not true. We must fit public health goals into those of a particular national culture. Elaborate programs are sometimes introduced into poor areas. Once the outside support is reduced or withdrawn, do we really expect that the country is able to continue the program? If they drop it, it is not because of lack of interest or need but because of a lack of means.

Ralph Patrick (*University of North Carolina, Chapel Hill, N.C.*): I agree with Braithwaite that anthropologists, in studying modern health programs, need to use some other model than that of the isolated, homogeneous, tribal culture. I agree that we do need to be concerned with the modern nation-state. However, perhaps the anthropologist's use of the tribal culture model is often misunderstood. I believe that most anthropologists use the model of the isolated, homogeneous culture simply as a methodological tool, not as an accurate description of the realities of the modern world. We do not take the isolated tribal culture seriously as an approximation of reality, but we do take it seriously as a very useful heuristic device in terms of which we can describe and analyze the realities of the modern world. We know that there is no such thing as a 100 per cent homogeneous culture. However, we have found that there are important differences between cultures in the "real world" in the *degree* of their isolation and in the degree of their homogeneity. Thus if we always keep in mind the fact that the model is simply a heuristic device, we find it quite useful in providing a continuum along which we can place our observations on concrete cultures.

I also agree with Braithwaite's emphasis on the importance of the national state rather than the tribal culture as a unity in the modern world. May I point out, however, that the behavioral sciences have in their combined storehouse of knowledge a good bit of information on the workings of the nation state. Sometimes we may neglect to use this knowledge, but the shelves of the storehouse are not empty. The sociologists have provided us with quite useful knowledge about the working of bureaucratic social organizations, and the political scientists, sociologists, and anthropologists have given us knowledge about the ways in which tribal, local, and community cultures are incorporated into national states. This knowledge is neither perfect nor foolproof, but I submit that we have much of it, and that it could and should be more thoroughly used in our studies.

Braithwaite: I think you are too optimistic about the knowledge social scientists have concerning nation states and the value of their "storehouse." Really, we know very little about national societies.

John Hanlon (*Department of Public Health, Philadelphia, Pa.*): I agree fully with Braithwaite in his reservations about "blind" public health activities and progress. As a public health worker I have always felt, especially when involved in international technical assistance programs, that public health programs should never be planned or implemented in themselves. This is particularly true with regard to the so-called underdeveloped areas of the world. On the contrary, public health programs should be planned and carried out in relation to over-all economic and social developmental needs. Here we come perhaps to at least one very definite contribution of social science: making this more evident to more public health workers throughout the world.

Braithwaite: One aspect of sociological research that merits special attention is the problem of the provision of medical services for the people. Problems in public administration arise due to conflicts in values, and there is also the problem of setting feasible public health standards in the light of what the community can afford.

In the West Indies during the days of slavery, there was no public provision of medical service. This was organized by the planters on an estate basis with public provision supplied only in the towns. When slavery was abolished, the spread of medical service through the community tended to diminish. Estate proprietors were no longer concerned with the health of the slave; this was now an individual matter. Consequently local medical practitioners became less assured of an income and tended to drift into town. This absence of medical provision for the countryside was counteracted by two factors. The first was the growth of the public health movement in Great Britain in the 19th century, which had an effect in the colonies. The second factor was the introduction of indentured Indian labor on a relatively large scale into the colonies of British Guiana, Trinidad, and Jamaica, West Indies. One of the problems posed by the Indian immigrant was that of public health. The long sea-passage, the differences of culture, and the poor health standards of the recruits, led to concern with this problem and, eventually, statutory provisions were introduced making it compulsory for the employers of indentured labor to provide hospital facilities for the sick indentured: a tradition that still persists in some areas.

Out of this historical situation there have evolved the present provisions for medical care, characterized by two outstanding features: (1) the mixture of public and private practice, and (2) the development of new forms of healing and of practitioners of healing somewhat in opposition to the established professions. The development of public health services was never meant to supersede private practice. The model that was followed was that of the United Kingdom, where public provision and private practice flourished hand in hand.

The organization of medical service faced the task of making provision on the basis of some sort of equality for a widely spread population. The position was difficult whether doctors had to be recruited from abroad or locally. The recruitment from abroad meant that governmental posts had to carry emoluments even more attractive than those in England. Recruitment locally had to face the complex of attitudes surrounding the medical profession.

The medical profession came in due course to be staffed by local people who looked upon the profession as one of the few means of social and occupational mobility. When the individual had been educated at his family's expense and much sacrifice, the tendency was to regard this education as an investment that should yield adequate returns. One result of this has been the creation of a tradition that regards private practice as the ultimate ambition of every doctor. Although at times there have been outcries about the overcrowding of the medical profession, the supply of doctors has not outrun the demand in these communities, which have expanding populations and rising standards of living.

As a result the governments of the area have had to increase emoluments for practitioners within the public service. The position has not always been easy, because salaries have had to be determined to a certain extent by the general standards of salaries within the civil service. Certain compromises had to be reached by which medical service for the people could be reconciled with the attraction of private practice and the need for economy in administration.

In most of the West Indies now the practitioner in public health is allowed to engage in private practice as well. Everywhere there appears to have ensued a greater spread than would otherwise have been possible in practice. The system, however, has led to complaints of abuse. The allegation is made that doctors neglect their public patients in order to maintain their private practice and that, in fact, the salaries they draw are a subsidy that they regard as compensation for the fact that they must live and practice in rural communities. Whatever the degree of truth in such allegations—and one would expect a certain amount of distortion—there is no doubt of the *belief* by the mass of the people that "better medicine" and better attention are given to those who can pay. As a result, instead of the pressure of demand being placed on the free service, it is directed toward the fee-paying one.

Another aspect of the organization of the medical services is the development, through the failure to provide adequate service, of certain intermediary groups in medical practice. The druggist and the nurse come to play a very particular role in the medical field. The nurse, of course, usually functions under medical supervision. There can be little doubt, however, that her particular responsibilities and the demands that are made upon her by the general community are usually beyond her capacity, granted the present level of training.

The druggist or chemist comes less under medical supervision, but performs no less a medical role. The general public resorts to his services for all manner of complaints, and demands forms of treatment that are not always recognized, either by law or by medicine. The druggist not only prepares prescriptions; his main source of income is the sale of patent medicines: these exist in such a wide variety that the making of his own prescription in the light of the individual's complaint is possible without a technical violation of the law. In addition, many druggists make good profits by compounding prescriptions prepared by *obeah* men or other practitioners of folk medicine.

The problem of medical care is only in part a problem of inadequate provision of recognized services. Rather, the inadequacies of the medical service have been so great for such a long time that profoundly different alternative theories of healing and ideas of medical care have developed. In some areas of the West Indies the "look-man" and the balm yard play an important part in treating the sick. It is of little concern to us here whether a tradition is of African origin, or how far it has had an independent derivation. Suffice it to say that in the multiracial areas, there is no ethnic specialization in the practice of the esoteric arts. The practice of the healing profession, like that of medicine itself, recognizes no racial barriers. The Indian patronizes the Negro "look-man" while the Negro has no hesitation in approaching the Hindu practitioner who has been successful enough to achieve a "national" rather than an ethnic or village reputation. Some people prefer to resort to the "indigenous" methods of healing; others fall back on them when there is no immediate satisfaction achieved from medical treatment, when the treatment is too prolonged and expensive, or when medical science declares that there is little hope for the patient.

The medical practitioner becomes aware of this only sporadically; usually when the patient reports "treatment" by another doctor, it is not clear whether the individual concerned is a genuine medical practitioner or not. Sometimes it appears that "magical attitudes" surround both medical practitioners and folk practitioners, and the patient makes no clear distinction between the two; sometimes the more sophisticated patient is aware of the negative judgment passed on folk medicine and deliberately deceives; in other cases participation in popular practices has been induced only by the pressure of the surrounding group, and the individual is ashamed of his own involvement. Thus a wide range of attitudes and sentiments surround the folk practitioner. There is no information as to the precise quantitative distribution of these beliefs or of their depth and intensity. Enough is known, however, to indicate that here we have a problem of real importance from the point of view of both public and private practice. The relevance to health education and the organization of the medical services is clear and immediately apparent. Physicians no doubt would welcome information on the long-term attitudes of some of their patients toward treatment: information that they are unable to obtain in the midst of a trying practice—such as why treatment is interrupted and of how and why recommendations are neglected. It is difficult to see how a public health campaign can proceed with any effectiveness unless the specific complex of attitudes surrounding a given disease are adequately understood and taken into consideration.

Aside from recourse to practitioners, elements of folk medicine are practiced by the individual or are prescribed by knowledgeable old folk in the village. This fact stresses the importance of divergent cultural traditions. One example of this is the practice of cultivating ganja (marijuana) in Jamaica, W.I., as a medicine for use in the care of tuberculosis and all manner of coughs and colds. Ganja is, of course, used for a variety of other purposes, and its production and consumption are rendered illegal by law.

Dentistry is another profession closely allied with medicine in which conflict occurs between the economic resources of the community and the high professional standards that are officially established. Throughout the West Indies there are a certain number of quack dentists in operation. The quack dentist attracts patients because of his availability (he operates principally in the country areas), because of his lower fees, and partly because the lower classes seek dental care only in painful emergencies, while regular attendance at the dentist's is a habit of the middle classes. Consequently, class factors enter here, and many lower-class individuals feel more at home with the known quack dentist than with the regular dentist.

One other aspect of medicine is the rise of other groups, "metaphysicians," psychologists, and others who give some sort of psychological treatment for personal problems as well as for all types of psychosomatic complaints. Sometimes these people fall afoul of the law, but more usually they practice psychotherapy of some sort without using or prescribing any drugs. Their presence is a reflection of the failure of the community to provide any genuine psychological service. The growth of nonmedical psychology as a profession involving forms of psychotherapy is not in the British tradition. Where psychologists are used at all, this is done under close medical supervision. In other countries the group of nonmedical psychotherapists would appear to perform a useful and eminently desirable social role. However, West Indian medicine is firmly part of the British tradition, and there is hardly likely to be approval of this practice.

Once again we see the gap between official aspiration and popular need creating a special class of practitioners whose activities, from a social point of view, can hardly be described as desirable.

In this particular set of circumstances it would appear that one of the possibilities for advancement lies in an organization of medical service that permits private practice but does not allow the exploitation of the situation by the doctor in the public service. The precise form in which such organization can proceed would be the result of research followed by administrative experiment. Clearly one possibility lies in forms of group insurance—of which there are several possible bases in company schemes, "friendly societies," trade unions, agricultural societies, and others—supplemented by effective government subsidy.

Hanlon: During the past few days, several of the speakers have pointed to the creditable "increased awareness" by public health workers of the social and behavioral sciences and the contribution they may make to the improvement of public health programs. Allow me first to attempt to analyze that term "increased awareness." In doing so, I shall try to heed the distinction made by the late Allen Gregg between Greek virtue and Roman morality.

Roman morality in general attempted to follow the most expeditious and pleasing course, and caused individuals to say or do things that would improve their personal status or cause others to like them more. Greek virtue encouraged speech and action that was based upon an absolute conviction of what was right despite the consequences. In attempting to be virtuous in the Greek sense, therefore, I may make some statements that may not be pleasing to all. If so, please be tolerant.

The trend toward the greater use of social or behavioral sciences by public health agencies, I feel, is based not so much on a well-conceived "increased awareness" of their value as much as it is based upon sheer need. Furthermore, in so far as the significant contributions that social scientists may make to the improvement of public health are concerned, I do not think that either the social scientists or the public health workers yet know with certainty what they are. This, incidentally, is the basic reason for a project we have recently begun in the Public Health Services of Philadelphia, Pa., with the assistance of the American Public Health Association, New York, N.Y., and the Russell Sage Foundation, New York, N.Y.

We were struck by the realization that while an increasing number of social scientists are to be found in public health agencies, they are all working primarily in relation to some categorical research project. Apparently no one, we discovered, was attempting to find out what the potential role of the social scientist might be in a general and continuing sense in a health agency. Therefore we have added a social scientist to our staff with the express purpose of trying to discover the contributions and *modi operandi* of such an individual on an across-the-board basis. This we visualize as involving work not only as a general staff consultant and advisor to any and all substantive program divisions but also in specific program planning, trouble shooting, and evaluative areas of activities. This leads to the question: "What does public health hope to get from the fields of the behavioral and social sciences?"

Many of you are undoubtedly aware that the past decade has been one of very considerable soul searching, self-criticism and wondering on the part of public health workers. Evidence of this may be obtained by regarding the titles of various symposia and conferences: "What is Next in Public Health?" "Where Are We Going in Public Health?" "Are We Getting Public Health in Tune with the Times?" Why this questioning, this searching, this introspection at this particular time? I think there is a very good reason and, if I am correct, it may throw some light on why there has occurred the hopeful wedding in recent years of the two professional fields under consideration, public health and behavioral science.

It seems to me that the 1940s represented a very significant turning point in public health history in the United States. Before that time the predominant problems that public health workers were called upon to solve were of such a nature that the solutions lent themselves to various ways of manipulating large numbers of people, with or without their knowledge and sometimes even without their consent. Parenthetically, such manipulations resulted not only in reducing drastically the instances of typhoid fever, for example, but also in altering to a not inconsiderable extent certain aspects of culture and society. While the holding of these great gains will of course require continued vigilance in the future, the great battles in these respects would now appear to depend more and more upon individual decisions and actions and interpersonal reactions.

The newer and increasing problems in public health do not lend themselves particularly, if at all, to the mass approach: the turning of a valve or the control of some focal point or outlet. Thus the prevention of deaths from cancer requires the early and repeated diagnostic check of very large numbers of individuals, and it is the word "individuals" that is important here. This being the case, we are immediately confronted with one of the world's most difficult problems: the extent of understanding, the wish to understand, and the willingness to react. This then, I think, is the reason for the recent surge of interest by public health workers in the behavioral and social sciences. We have been forced to realize by dint of sheer circumstance that we have a great deal more to learn about the nature and motivations of people and their entire social groupings. We are fortunate indeed, as pointed out by Donald Young elsewhere in these pages, that in coming together the two groups—the public health workers and the social scientists—have been able to find great areas of empathy.

In this regard may I say that I have no patience with the occasional social or behavioral scientist who belongs to the school of thought that says, "Let's study the charming little natives, but for Heaven's sake, let's not do anything to affect or change their precious culture." As social scientists, you know that a large city like Philadelphia, Pa., is a complex of a wide range and number of cultures and subcultures. These have a wide range of sanitary and health understanding and a wide variety of sanitary and health practices, some good and some bad. As a public health worker I wish very definitely and conscientiously not only to know more about these cultures, their interests, and motivations but also definitely and conscientiously I wish to change a great many of them for the benefit of the total group. Why do I say this? Essentially for two reasons. First, in recognition of the fact that public health endeavors have proved to be some of the greatest and most dramatic contributions to social and cultural change and betterment. Second, it is a matter of sheer survival: for the individual, for his social group, and for the total society. This is particularly true in a new and ever-changing society. The basic job that confronts both public health groups and social scientists, as I see it, is one of intelligent and guided change.

IRWIN M. ROSENSTOCK (*United States Public Health Service, Washington, D.C.*): Would Hanlon comment on the distinction between natural change and guided change?

HANLON: Nearly everything we do is an *attempt* at *guided* change. We cannot let one or two unrecognized consequences stand in our way. Take the car for example: It has had many bad results, but should we say no more automobiles? Or take diphtheria prevention. Many of today's juvenile delinquents would not have survived infancy if we had not developed diphtheria immunization. Should we no longer prevent diphtheria because we have so many juvenile delinquents?

ROSENSTOCK: Effective programs of diabetes control serve to increase the chances that diabetics will have children. This means that the more we control diabetes, the more diabetics we produce. Should we not be more aware of the consequences of what we do?

EDWARD SUCHMAN (*New York City Board of Health, New York, N.Y.*): I am a social scientist working in an operating health agency: the New York City Department of Health. I am there, I believe, not because of "increased acceptance of social science," but because there is a need for someone who can deal with behavioral and community problems. Bacteriologists have done their work so well that they are doing themselves out of their jobs. Now that bacteria are under control, public health has turned to people; however, environmental sanitation is one kind of problem; getting people to change their health habits is quite another.

Social scientists are functioning as clinicians in this kind of work; we ask a great many questions about each problem presented to us: as any doctor would when faced with a sick individual. We have to ask these questions, not because we do not have a storehouse of general knowledge, but because we need to apply this knowledge to a specific community, and therefore need to know more about each specific problem. The applied social scientist must understand the particular problem he is facing before he can relate it to general social theory. That is why we ask so many questions.

What kind of work does a social scientist do in an operating health department? He does everything: from basic to applied research.

(1) *Basic research.* Many of the current public health problems strike deeply into basic social theory. Some of our studies in this area would include:

(*a*) *Seeking medical care.* This problem arises in terms of meeting the problem of what to do when not feeling well. What makes a person "sick?" The doctor does. A person is not sick until he sees a doctor—until then he is simply not feeling well. We are trying to determine the reasons a person seeks a physician. We find that a person usually talks to someone else before going to a medical doctor. We call this the "sick-seeking status." Before he can become a patient, he goes through many stages of discussion and decision making.

We have divided the process into five stages: (1) the motivational or "felt" need stage; (2) the gathering-of-information stage; (3) the decision-making stage; (4) the seeking-of-medical-care stage; and (5) the carrying-out-of-medical-treatment stage. After a patient has completed the treatment stage, he must regain the "nonsick" role and perhaps enter into rehabilitation. Sometimes with chronic diseases, he has to accept sickness as a way of life.

(*b*) *Cultural components in the "meaning" of illness.* In this study we look at the following five ethnic groups: (1) Negro, (2) Italian-born, (3) Jewish, (4) Puerto Rican, and (5) native white to determine how they differ in their reactions to different diseases. We also wish to study the impact of illness on these people when they return to normal or nonsick life.

(*c*) *New York "Navajo" project.* This attempts to apply John Adair's ideas to the needs of Puerto Ricans in New York, N.Y., using concepts such as the health visitor. The city of New York has problems as complex as those anywhere in meeting the health needs of various ethnic groups that fall outside the majority culture.

(2) *Applied study: marketing public health.* What is the difference between marketing public health programs and marketing Wheaties? While not identical, each involves such factors as resistances to change, habit barriers, communication, and motivation. Much applied social service in public health is of this "social engineering" type.

Mass detection. Some of the studies in mass detection have included:

(*a*) *A mass tuberculosis X-ray program in the Bronx, N.Y.*, in which community organization seems to play a minor role. The most important factors are persuading the public health people—doctors, nurses, and health educators—to help induce others to join the line and enter the X-ray truck, the presence of which is advertised by loud music keyed to the national or social origins of the neighborhood.

(*b*) *Carcinoma of the cervix.* Women have an aversion to such examinations, which rules out sound trucks or door-to-door appeals. One solution may be to initiate the taking of self-smears if technique can be taught adequately.

(3) *Administrative problems.* Many of our day-to-day concerns are with program operations. For example:

(*a*) *Rat-bite control.* If there were an incidence of rat bites on an exotic island, anthropologists would flock to study it; because it happens in New York, there is little interest in it. We have spent a great deal of money to eradicate rats. It is very difficult to *find* landlords, then to *fine* landlords. Basically, we have to change the way of living of Negroes and Puerto Ricans in these neighborhoods, in regard to household sanitation.

(*b*) *Milk dating.* It is no longer necessary from the public health point of view to put dates on milk caps. However, this turns out to be a labor-industry problem. At this writing the Department of Markets requires dating of milk.

(*c*) *Equine encephalitis.* This year we will reinstitute mosquito control, not because community health requires it, but because people are demanding it.

In addition to the above specific administrative problems, there are many other social health problems that constitute operational needs for program planning and development, such as alcoholism, venereal disease, accidents, juvenile delinquency, and gerontology. These are all public health-behavioral science programs.

ROSENSTOCK: I present a report of a recent Public Health Service study—conducted in five United States cities—to measure the impact of Asian influenza upon community life.[1] This project, reflecting a multidisciplinary approach to the study of a public health problem, involved teams of anthropologists, sociologists, and psychologists in addition to physicians, nurses, and public health administrators.

I have two purposes in making this report. The first is to present study findings of inherent interest that identify steps in disease control that are not considered frequently enough by public health officials.

The second purpose is to demonstrate that despite communications difficulties, professional differences, and different interests, approaches, and competencies, professionals of different disciplines can work together efficiently and produce useful results.

Public concern with influenza in 1957 was apparently not great, and fewer people were vaccinated than had been anticipated; however, the lack of concern with influenza was not confined to the general public but was also observed in professional groups. I shall attempt to analyze the causes of these attitudes and to suggest implications for the planning of future control programs.

During the summer of 1957, meetings were held with many planning groups, including the American Medical Association, the Association of State and Territorial Health Officers, the American Hospital Association, the Public Health Service, and the major national voluntary agencies. These groups, agreeing that an epidemic of influenza was imminent, developed recommendations for local planning of vaccination, information, home-nursing, and home-care programs. Recommendations were submitted by each organization through its usual channels to state and/or local counterparts.[2]

The anthropological studies made in five cities showed that policies on vaccination varied widely. In one city systematic efforts were made to control vaccine supplies and distribution and to inoculate on a priority basis, while another city developed no community program whatever. The other three cities developed limited programs. With respect to other national recommendations, attempts were made in three cities to keep the public informed about the local situation, but efforts were inconsistent or lacking in the other two cities.

While additional home-nursing services were deemed necessary by official or voluntary health agencies in three cities, no preparations to enlarge the services resulted. In none of the cities were plans made to develop new homemaking services or to augment existing ones.

In two of the five cities studied—the two with the most highly developed vaccination progams—it was possible to obtain detailed psychological data from interviews with representative samples of the general public comprising 1600 families or approximately 4000 individuals. In one of these cities, 23 per cent of the population was vaccinated; in the other 13 per cent. Since at least some portion of the vaccinated consisted of members of essential or priority groups whose vaccination was almost compulsory, it would appear that the public's voluntary use of the vaccine was not great. This was true despite the fact that health officials in both cities reported that their supplies of vaccine had increased progressively and that the need to restrict vaccine to priority groups had passed before the interviewing of the general public was undertaken.

The study showed in both cities that only 4 per cent of the families interviewed actually made any preparations for influenza other than vaccination. Such preparations might have included stocking up on staple foods and medicines, arranging for home and child care and seeking training in care of the sick. In summary, data obtained from these two typical cities strongly suggest that *community* preparations to meet the impact of influenza were varied but limited. On an *individual* basis, the vast majority of families took no action to ward off the threat of the disease.

In attempting to find the reasons for the apparent lack of public response to the threat of disease, let us consider the findings of other psychological studies on why the public does or does not accept such preventive health services as polio immunization,[3] topical application of sodium fluoride[4] and the reasons for its decisions to participate in case-finding programs for tuberculosis[5] and cervical cancer.[6]*

Only the barest outline of the findings will be attempted here. Briefly, they concern the individual's beliefs about his vulnerability to disease, its severity, and available means for combatting it. Other things being equal, a person will not take action to ward off a disease unless he believes that: (1) he is susceptible to it; (2) its occurrence would be a serious matter; and (3) effective and acceptable means for preventing or controlling it exist and are available to him.

What did the groups in this study believe about influenza and influenza vaccine? While most members of the general public had favorable opinions about the vaccine, the vast majority did not believe that they or members of their families would contract influenza. Not more than 25 per cent of the 1600 families interviewed even accepted the *possibility* that someone in the family might contract the disease. Regarding beliefs about the severity of the condition, it was quite evident that concern was low. Surprisingly, less than one half of the general population believed that Asian influenza was more serious than the usual common cold, grippe, or "flu." Less than 3 per cent of the population believed that contracting influenza would require any marked changes in their daily activities.

Thus most members of the general public did not believe they were vulnerable to Asian influenza, nor did they believe that contracting it would be a serious matter. This combination of beliefs made Asian influenza a matter of low concern. Consequently, despite the favorable opinion about the vaccine, little public action was taken.

The explanation for the kinds of action that were taken by community agencies is somewhat more complex than for individuals but follows essentially the same pattern. Public health officials and representatives of voluntary health agencies tended to believe that widespread influenza outbreaks (affecting, for example, as many as 20 per cent of the population) had a reasonably high probability of occurrence in their communities; that its occurrence could have rather serious effects on community functioning, and that vaccination should be fairly effective in conferring immunity. They tended to believe that systematic programs of public information were required. Moreover they believed that programs to provide home-care services to those who needed them would probably be required in the event of outbreak.

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* A more general discussion of explanatory principles is provided by Hochbaum[7] and Kegeles.[8]

Officials of medical societies tended to agree with other groups that vaccination could be at least moderately effective in conferring immunity. However, although they agreed with public health officials that as many as 20 per cent of the population might be stricken with influenza, they did not believe such incidence would be significantly higher than was usual for the season. More important, *medical society officials did not believe an influenza outbreak would have any serious consequences for their communities.*

In accounting for actions taken by community agencies, it must be kept in mind that beliefs of influential decision-makers carry great weight. In the present study it was possible to identify the medical society in each city as the one key group that could determine the kind of action to be taken or whether any action would be taken. While it was to be expected that the medical group would have the central responsibility for influenza, it unexpectedly found that its authority was relatively complete. For example, efforts of several voluntary agency people to stimulate programs were dropped when medical society officials informed them that the proposed actions were unnecessary. In other instances, the submission of a plan by a voluntary agency to the medical society ended with a "pocket veto," that is, the medical society simply did not discuss it.

The influence of the medical society extended beyond purely medical matters. In one of the cities certain key officials of the medical society occupied positions that permitted them to influence the release of local news pertaining to influenza. In that city virtually no local news on influenza was released to the press, and no data on school absenteeism were released until the middle of the fall. At that time local newspapers obtained a court injunction requiring the school board to release such figures.

In contrast, when medical society officials attempted to set up a vaccination program, it was established in a highly efficient manner permitting the orderly, systematic vaccination of the key groups covered. In each of the five cities it became evident that while ideas could emanate from a variety of sources, their sponsors had ultimately to obtain the active approval of the medical society before successful programs could be developed. Health officers, chiefs of nursing services, and executive secretaries of voluntary agencies were all aware of the fact.

It is thus clear that communities responded only partially to national recommendations because officials of the potent local medical societies tended to believe that an influenza epidemic did not pose serious problems. If this were true why did medical societies take any action? Why did four of the five communities establish vaccination programs, albeit varied ones? No definitive answer to these questions can be given, but a few pertinent observations may be made.

In two cities prior experience with local poliomyelitis immunization programs had resulted in mutual distrust between public health officials and the medical societies. Various circumstances had resulted in more extensive public polio vaccination programs than were deemed necessary by the local medical societies, and the public health officials believed that this belief was due to a laissez-faire attitude on the part of the medical societies. Consequently when confronted with the influenza crisis, these societies took firm action to prevent a recurrence of the earlier happenings. No evidence was obtained to indicate a similar background in the three remaining cities.

Inferences drawn from the data suggest some basis for the different views of medical society and public health officials about the anticipated epidemic. It appears that the answer may lie in the different orientations of the two groups toward the nature of health problems. The primary concern of public health agencies was that the anticipated high prevalence of illness might seriously impair or overtax normal community services. In short, the *number* of persons who might become ill was the point of concern for public health workers.

Officials of medical societies tended to be less concerned with the *number* of individuals who might be stricken than with the *clinical seriousness* of the disease in those who might contract it. From that viewpoint the private practitioner might regard a single case of paralytic polio in his patients as much more serious than a 50 per cent attack rate of influenza. Medical society representatives tended to look at the disease in terms of the impact on the individual patient, while voluntary and official health agencies tended to look at the disease in terms of the impact on the community. For public health groups, then, the orientation was to the *community as patient*; for medical societies the orientation was to the *individual as patient.*

Much of our nationally derived information simultaneously served both orientations. For example, Leroy E. Burney, Surgeon General of the Public Health Service, Washington, D.C., in addressing an earlier conference of State and Territorial Health Officers had said, "From the point of view of the individual, we feel there is little cause for special anxiety or undue concern . . . the 10 to 20 per cent of the people who might contract Asian influenza would have a relatively mild illness. . . . From the point of view of the medical profession and the public health specialist, however, the problem takes on a somewhat different aspect and has special interest because of its potential effects on a community as a whole."[9] In general the single statement that the outbreak was likely to be highly prevalent but not clinically serious could be interpreted by public health workers as *constituting a threat to the community*, and by clinicians as *not constituting a threat to the individual.*

Five principal conclusions may be drawn from the foregoing material:

(1) Policies and programs agreed upon and transmitted by national groups were not consistently reflected in local action. In the communities studied in the United States, vaccination programs and other measures for controlling influenza did not achieve the level of individual and community acceptance desired by national groups.

(2) Whether *individuals* would take action to prevent influenza depended mainly on three factors: (a) their beliefs in their vulnerability to the disease;

(b) their beliefs about its seriousness, and (c) their beliefs about the efficacy of preventive measures.

(3) Whether *communities* would take action depended largely on the relevant beliefs of those in authority to make health decisions. In the five cities studied the local medical society was crucial in determining the kind of action that would be taken relative to influenza.

(4) The different orientations to health problems of clinicians and public health workers may provide a basis for understanding how communities behaved in response to the influenza threat in 1957.

(5) The anthropological and psychological findings showed several interesting points of comparison.

It is possible that the psychological approach alone would not have identified adequately the community power structure that was so important in explaining the events of 1957. On the other hand the anthropological approach would probably not have been sufficient to explain many of the factors that gave rise to public apathy. However, the two sets of findings considered side by side give much greater depth of understanding and confidence in the findings than would either of them alone.

Time will not be taken now to spell out the implications of the findings of this study for the planning and operation of public health programs. It may be suggested, however, that effective disease control depends not alone upon knowledge of the epidemiology of disease. It depends as much upon knowledge of the *epidemiology of community decision-making and action.*

References

1. Rosenstock, I. M., G. M. Hochbaum & H. Leventhal. The impact of Asian influenza on community life: a study in five cities. Public Health Service Monogr. To be published.
2. Ogden, H. 1958. Influenza. 1957. Bur. State Service. 139 pp. Mimeographed draft. Public Health Service. Washington, D.C.
3. Rosenstock, I. M., M. Derryberry & B. K. Carriger. 1959. Why people fail to seek poliomyelitis vaccination. Public Health Repts. **74**(2).
4. Meltzer, N. S. 1953. A psychological approach to developing principles of community organization. Am. J. Public Health. **43**(2).
5. Hochbaum, G. M. 1958. Public participation in medical screening programs: a sociopsychological study. Public Health Service. Publ. No. **572.**
6. Flack, E. G. Participation in a Casefinding Program for Cervical Cancer. In preparation.
7. Hochbaum, G. M. 1959. Some principles of health behavior. Presented at the conference of state and territorial dental directors with Public Health Service and the Children's Bureau. Washington, D.C.
8. Kegeles, S. S. 1959. An analysis of the potential acceptance of dental care by the use of some behavioral principles. Presented at the conference of state and territorial dental directors with the Public Health Service and the Children's Bureau. Washington, D.C.
9. U. S. Department of Health, Education, and Welfare. 1957. Proceedings, Special Conference on Influenza. Surgeon General Public Health Service with State and Territorial Health Officials. : 4. Washington, D.C.

Patrick: The discussion thus far has been fruitful and interesting, and I am somewhat reluctant to introduce another line of thought. Thus far we have limited ourselves to one type of problem in which the behavioral sciences can contribute to public health. However, there is another kind of problem on which some behavioral scientists have been working, and I propose to discuss it.

The discussion thus far has concerned the social and cultural determinants of the careers of health programs, that is, the ways in which culture and social organization may help to determine the success or failure of public health programs. As an example, we may take the work of John Adair and his colleagues at Many Farms and their many demonstrations of the ways in which Navajo culture and Navajo social structure enter into demographic characteristics of groups, but their utility is restricted because, for the most part, *process* is missing. It seems to me that this tendency of epidemiological studies to remain descriptive is due to an old-fashioned concept of the nature of causation or, if you prefer, the nature of determinants. In terms of this view, epidemiology can operate legitimately only at the descriptive level, because it is assumed that characteristics of groups cannot *really* cause anything. The assumption is made, sometimes implicitly and sometimes explicitly, that "causes" can be found only in the somatic system. This is the usual assumption of physicians and physiologists: that "causes" may legitimately be found only at the physiological level of abstraction, in terms of biochemical and other processes.

This is a form of *reductionism*, but some of my psychology colleagues are also reductionistic. They accept the legitimacy of physiological determinants of health and disease states, but also argue for the legitimacy of determinants at the psychological level of abstraction: such as drives, needs, and emotions. These psychologists are willing to move from the organic to the personality level of abstraction, but are reluctant to go on from there and to accept social structure or culture as a cause.

If the social sciences are to make their full contribution to our understanding of the determination of health and disease states, I submit that we must accept the legitimacy of causes at any or all of four or five levels of abstraction. These must include the levels of abstraction at which the social sciences operate: those dealing with the group processes of social organization and culture. I do not feel that we must move to a deterministic position about either society or culture, but I do feel that we must accept the level of social organization and culture as no less legitimate for the finding of determinants than the personality, organismic, or biochemical levels of abstraction. Otherwise we shall be limited to making descriptive statements about the associations between way-of-life factors and health-and-disease states, leaving it to the clinical disciplines that get under the skin of the individual to posit determinant process. Without conceiving patterns of social interaction and culture to be of "causal" significance, the disciplines that deal with social science variables will clearly remain only descriptive in their public health significance.

SUCHMAN: Do you think social processes *really* cause disease? Could you give me an example?

PATRICK: There are examples in the literature which, I think, demonstrate that social and cultural processes *do* have something to do with the determination of physiological states. Take the studies of maternal deprivation. These studies have shown that children in institutions who are deprived of continued, warm, emotionally-laden contact with a mother or a mother surrogate exhibit certain quite predictable psychological symptoms. These children tend not to be very responsive to human contact; they do not smile as early as would ordinarily be predicted; they do not express feelings in ways that children of their age usually do. Here we may see a "causal" chain from the social to the psychological. A social interaction process—or, to put it in another way, the *lack* of a certain kind of social interaction—seems to be crucial in determining certain psychic states that may be called emotional impoverishment. However, the causal chain does not stop with the production of psychic states. The lack of this kind of social interaction is also reflected in indices of somatic states. These children do not grow well. Their rate of growth is significantly below that of the so-called normal children. Here we have a process of social interaction reflected in physiology, that is, in growth rate. Furthermore these children also appear to be especially susceptible to various killing diseases. They die faster than normal children. I think we are on quite sound ground here when we say that a process of social interaction helps determine physiological states, low growth rate, and high death rate. Accordingly, if this is valid, we *can* say that social processes cause health and disease states.

A second example comes from recent work done in Seattle, Wash. These studies, concerned with the incidence and prevalence of tuberculosis, started out to test some well-known hypotheses linking overcrowding and certain other characteristics of lower-class life in the American city with tuberculosis. In the areas of Seattle surveyed by these studies, there were a number of people living alone in one room. For purposes of testing the overcrowding hypothesis, these social isolates were removed from the sample, since they tended to lower the crowding index of the area as a whole. When the lodgers were analyzed separately, however, it was found that their tuberculosis rate was significantly higher than that of people living in overcrowded quarters. The hypothesis that these studies point to is that a social variable—social isolation—may be of determinant significance in the disease tuberculosis. Thus it is not enough to say that tuberculosis is "caused" by the tubercle bacillus. There are other processes involved in the causal chain, and some of them are social and cultural. Of course, the hypothesis that social isolation is determinant of a high tuberculosis rate is not enough either. We should certainly be in better shape if the entire causal chain could be established, possibly through a linkage of social isolation to certain emotional and psychic factors, which may in turn be determinant of states of endocrine balance, which may in turn be linked to raising or lowering the bodily resistance to tuberculosis. It seems to me that the causal chain has to be built all the way from the social and the cultural through the psychic, and to the physiological and somatic.

Finally, I wonder if we do not need to broaden the definition of the technical that is held by many members of the public health team and even by some social scientists. We define the information required by the engineering and medical sciences as "technical," but we tend to regard the information that would be wanted by a sociologist or an anthropologist as "common sense" and thus not technical. If we could succeed in broadening the definition of the technical to include social and cultural information, we might find that this information would then be recorded.

For example, a public health nurse in this country might automatically record and report to the physician an infectious disease episode that she may observe in a diabetic patient. The nurse knows that an infection is a significant factor in the course of diabetes and that it may require a readjustment of his insulin dosage; so she records it and reports it to the physician. However, recent epidemiological studies have indicated that a divorce may be just as important a determinant of the course of diabetes as an infection. I wonder whether the same public health nurse would record the divorce, if it were brought to her attention, or would feel that this information is technical enough to warrant reporting to the physician. Here we have certain kinds of information defined as "technical," and thus reportable, and certain other kinds of information defined as "nontechnical," and thus not reportable. Perhaps we need to broaden our concepts of the technical to include social and cultural variables.

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